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THE NEXT RUBBER EXHIBITION

AMERICANS who enjoyed and were benefited by the Third International Rubber Exhibition in New York in 1912, and the fourth in London in 1914, will be interested to learn that plans are well under way for the fifth exhibition to be held in London in June, 1921. Many governments, important industrial associations, and leading rubber growers and manufacturers of rubber goods and machinery have already assured their hearty cooperation in making the affair surpass in magnitude and excel in helpfulness all the exhibitions held since their inception in 1908. Experience has shown that not only are such displays of high educational concern to the general public, but that they are of positive value to the entire rubber trade. The International Conference, which is held in connection with these exhibitions, is always a feature of outstanding interest. The essays submitted by the foremost specialists in the rubber world cover a wide range of subjects of vital import to the trade, and the practical discussions by men who through their genius and industry have achieved real success are stimulating to an exceptional degree. It may seem early, but it is none too soon for the leaders in the rubber trade in this country to prepare for ample and creditable representation at the big exhibition.

OVER EIGHTY MILLION TIRES

J. C. FREDERICK in the *Review of Reviews* forecasts the automobile business in a most interesting fashion. Indeed those tire men who fear immediate "saturation" may well read and take hope. Here are some of the figures. Present census of automobiles and trucks in the United States, 7,750,000. Saturation point based on Iowa per capita figures, 40,800,000 or on one-fourth of that, 10,200,000 plus 7,750,000, which equals 17,950,000. This expressed in tire terms is 71,800,000 tires and tubes. Europe's need Mr. Frederick puts at 31,300,000 cars. He points out also that the American car is popular and that the supply does not equal the demand. Say Europe can use 10,000,000 tires on the above basis it would look as if some time within the next few years 81,800,000 new tires will be built in American factories, and then there are the replacements. Not really a bad outlook.

BRITISH EXPORT EFFICIENCY

WHILE Americans have long realized the truth of the saying that British business men are the world's greatest overseas traders, and have appreciated the fact that the limited capacity of the home market for absorbing manufactured products has been a powerful factor in impelling British business men to strive unceasingly to expand the volume of their foreign trade, but comparatively few in this country have had much knowledge of the ingenious methods employed by the British to gain their commanding position in the mercantile world. Nor is it surprising that Americans have known so little of the magnitude and the intricate ramifications of the machinery devised by the British, with and without government aid, for enlarging the scope of overseas trade.

Americans, for instance, have no counterpart for the British Trade Corporation, scarcely three years old, with a fifth of its £10,000,000 capital paid up, and which has already helped large and small British manufacturers to sell many million pounds' worth of goods overseas. Nor have American manufacturers an organization which functions like the Federation of British Industries, a trade organization of 20,000 producing firms, all British. It is organized by trades and districts, is governed by a grand council of 211 members, conducts expositions at home and in foreign countries, compiles an export register, and, apart from the British Government, maintains trade commissions in numerous foreign and colonial markets.

Great Britain learned many valuable lessons from aggressive, commercial Germany; and so, too, America, which is steadily approaching the saturation point in its

own great home market, and which must plan for a larger share of overseas commerce, may well study closely the intensive methods and far-reaching experiences of the big European nations in developing their foreign commerce.

A TROPICAL COLLEGE FOR TRINIDAD

WORD comes that the long continued efforts of Sir Francis Watts have been successful in securing an Agricultural College for the West Indies. The location will be the tropical island of Trinidad which is ideal as to climate and soil and its contiguity to Central and South America and the United States.

The experiment station at Port of Spain, Trinidad, has done much already in rubber, cotton, and the like, and the college will begin with a wealth of material right at its doors. A university so close to our borders, with a faculty made up of the best talent from the vast possessions of Great Britain is now to attract scholars from our universities who more and more are turning to tropical work.

LIGHTER CARS AND SMALL TIRES

IT may be hard to convince Mr. Average Car-Owner that gasoline consumption is really exceeding production, and that the report is not a cunning canard put out by the great oil companies as a pretext for raising prices; but it is a fact, nevertheless, and the most unbiased authorities say that there is no reason to believe that gasoline will ever be cheap again or that the output will ever keep pace with the demand.

Limiting the number of cars or rationing gasoline might be suggested as alternatives; but, inasmuch as neither course would be popular, and as no satisfactory substitute for "gas" is being marketed, the rational remedy for such a situation would seem to be the manufacture of motor vehicles which will not require nearly as much fuel as those now in vogue. In other words, cars must be made lighter; and, while having engines of ample power, the excess now provided and so often misused must be greatly lessened if not eliminated.

Thus the heavy passenger car will gradually disappear, and a small, light motor vehicle appear. There are signs that in the near future such a car will be put on the market for as low a price as $250 and will use scarcely half the "gas" now ordinarily consumed, and the cost of which must rise in direct ratio to its increasing scarcity.

Already the Germans, forced to deal with a serious "gas" shortage, are turning out a small, light, cheap car said to be quite efficient. Other European countries, also confronted with a scarcity of petrol, are planning to do away with cumbersome cars that are veritable locomotives consuming an inordinate amount of valuable fuel.

In this country a famous electrical wizard announces the invention of a remarkably light, power-economizing motor car, and soon to be marketed. Evidently necessity, "invention's mother," is preparing us for a radical change in automobile construction and incidentally for a great output of light, low-priced, economical cars—perhaps for the millions, all of which must stimulate to a greater degree than ever the manufacture of rubber tires, the *sine qua non* of the modern automobile.

NOT HEVEA ONLY

WITH the very commendable preparation that is going forward for study of and experiment upon *Hevea* trees no one can quarrel. It is not only wise, but necessary. Nevertheless, would it not be the part of wisdom to bring both the *Castilloa* and the *Manihot* up to a greater productiveness also? In many instances individual trees have shown a surprising product. Furthermore, who knows that wound response cannot be brought about in these trees? If so, with their abundant flow of latex they might in time rival the *Hevea*. Then, too, there is the immunity to disease that *Castilloa* particularly enjoys. The *Hevea* has proved such a wonder that the others are for the time being about forgotten, which is a pity.

FACTORY ORGANS

THE HOUSE ORGAN, so-called, is quite likely to be shaped for the selling force, the dealer and sometimes the ultimate consumer. The Factory Organ, however, is the newspaper of the mill and, in its present development, is proving a power for good that it is hard to overestimate. It gives just the needed opportunity for the wise executive to talk to his employes in terms they understand and in a way that makes a permanent impression. The publication is the forum of the factory. It chronicles the minor happenings, the pleasant personalities, corrects errors in thought and gives merit, even minor merit, a chance for appreciation.

As a means of Americanization, of welfare work, or assistance to all of the right thinking, it is priceless. More power to it.

CONFIRMATION HAVING BEEN MADE OF THE REPORT OF a $300,000,000 merger of the General Chemical, Solvay Process, Semet-Solvay, Barrett, and the National Aniline and Chemical companies into what will be the largest concern in the world manufacturing and distributing chemical products, the rubber industry, one of the greatest users of chemicals, is pardonably curious to know how its interests will be affected by such a gigantic consolidation. Assurance is given that the new corporation does not intend to increase its profits by raising prices, but rather by effecting numerous economies, by lessening waste and "lost motion," by more efficient production, and by wisely coordinating the forces of the hundred and one establishments that will pass under single control.

India Rubber in the Oil Industry

Rubber figures as a considerable item, as it plays an indispensable part in the colossal petroleum industry of the United States, in which, according to the Geological Survey, over 16,000 companies and individuals operating wells are expected to produce in 1920 some 400,000,000 barrels of crude oil worth about $1,260,000,000. Estimates of the actual capital involved in the production, refining and distribution of petroleum, while varying greatly, give an approximate total of over two billion dollars for the entire country.

Of this enormous total about one-third is accredited to the Southwest, where the recent development of petroleum fields has amazed the nation by its magnitude and rapid extension. From Texas to the Pacific Slope in a hundred territories thousands of wells are daily yielding hundreds of thousands of barrels of oil, and a multitude of prospectors are continually opening up new areas and drilling for new supplies of a commodity for which there is an ever-increasing demand.

California, of whose oil industry more complete statistics are available than of some of the other southwestern states, produces fully one-fifth of the world's total supply of petroleum. On July 1, 1920, there were nearly 800 concerns in the state operating 9,311 wells and drilling 454 more, 261 having been started in the first six months of 1920, as compared with 182 in the same period of 1919. The state's total crude oil production for 1919 was 101,221,000 barrels, according to reports kept by the Standard Oil Co., and according to the state's own reports for 1919, three hundred twenty oil companies had $139,321,872 in cash and $222,244,897 in properties.

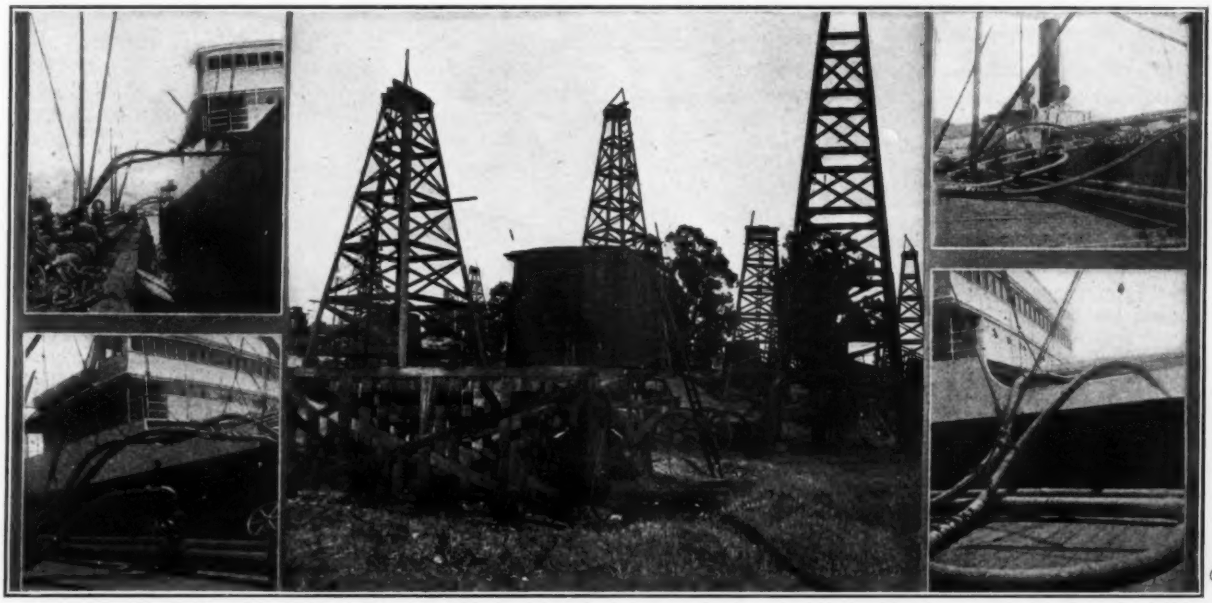
In Texas it is estimated that over 300 companies are producing oil, many of them in great quantities, and about 600 more are drilling. In New Mexico, it is said, that 70 oil companies are operating, 28 in Arizona, 26 in Utah, and 30 in Nevada. Attracted by the steadily-enhancing value of the crude product, many more concerns with ample capital are planning to go actively into the big "oil game," and consequently augment the demands being made upon manufacturers of various rubber essentials for the oil fields. The general complaint among oil well drillers is that operations are greatly retarded by slow deliveries of machinery. Little fault, however, seems to be found with the execution of orders for rubber goods, the sales of which in the Southwest oil industry total several hundred thousand dollars annually.

While most of the rubber used in drilling, pumping, conveying, etc., in the oil industry in this section is provided by Eastern and Mid-Western factories, a fairly large proportion of such goods is being furnished by makers of rubber specialties on the Pacific Coast.

DRILLING OUTFITS

It may not be amiss here to touch briefly upon that most essention operation in an oil field—drilling, and the apparatus with which it is carried on. While old-time oil men insist that for drilling there is nothing to rival the familiar standard, immovable derrick, up-to-date prospectors rather favor compact portable drilling rigs, which are not only easily moved about and quickly erected, but with which, it is claimed, wells can also be drilled in a much shorter time than with the standard rig. Very deep drilling may be done with the former, but the latter has proved its value for shallower wells, and has been efficient even at depths of 2,500 feet or more. A fine type of drilling outfit is the combination derrick, about 80 feet high, so arranged that it can be used for both cable and rotary drilling. In cable drilling the tools, which fairly chisel a hole through the solid earth, are alternately lifted within the derrick and then dropped through an ever-lengthening casing of iron pipe; while in rotary drilling the boring is done by a low-set machine, the essential feature being a revolving horizontal steel table, in the center of which is fastened the drilling bit and through the center of which can also be slipped the sections of pipe casing. The table is geared to a bevel pinion on a shaft driven by a motor or gas engine.

When oil is struck a long piston rod replaces the drilling "string" in the center of the derrick, the pumping jack is set over



Rubber Goods Are Indispensable to the Oil Industry in Drilling, Pumping and Conveying Crude Oil, Also in the Final Distribution of the Refined Products

the well, and the picturesque walking beam begins its task, one which every oil man always hopes will be a never-ending series of "ups and downs."

BELTING

When the stage is all set for an "oil drama," rubber is ushered in in an important rôle in the very first act; that is, the operation of "spudding in" or drilling a well. It is needed primarily for belting. The big oil companies of the Southwest have tried all kinds of belts for driving drills at high speed 24 hours a day in the fields, both by the rotary chiselling or "percussion" process, in which a 625-pound bit is lifted and dropped into the hole; and the boring method, in which a 100-pound bit with a serrated tip is revolved at the bottom of an 8 or 10-inch iron pipe to which additions are being constantly made; but the one belt that the workers find stands the hardest kind of abuse and gives the greatest efficiency is that made of rubber.

Rubber belting is preferred in the oil fields because it is tougher, more flexible, more cohesive and has greater tensile strength than leather; it hugs the pulleys closely, making anti-slip "dope" unnecessary; there is no stretch to it, hence no time lost in take-ups; it is uniform in its construction, joints being eliminated when measurements are sent to the factories for endless belts; there is no limit to the width, thickness, quality, or design in which it can be made up; it is water-proof and can be made practically impervious to oils, acids, gases and steam; and it can withstand the roughest service in sandy sections and extreme variations in temperature. A fact of no little interest, too, is that rubber belting costs less than leather.

A familiar type of rubber belt used on oil well drills is 12 to 14 inches wide and made of 6-ply canvas duck with a good quality of friction. For a few special cases 8-ply belts are made to order. All such belts, drillers say, withstand the heavy, uneven jerks caused by the weight of the tools and the spring of the cable much better than leather. When a well has been set up and a gasoline or electric-driven pump has been installed, the transmission belt that is preferred to connect motor and pump is a 4 or 5-ply heavy duck well frictioned with rubber and generally a foot wide. The durability of such belts often amazes the users, many giving five and six years of service despite oil, grit, slush and rough usage. It might be added that such belts are generally of the type having the plies stitched and the surface rubber-covered to make it moisture-proof.

OIL HOSE

Another article of even greater utility in the oil industry is hose; and many are the varieties used to meet exacting conditions. It is first employed in the primary or drilling operation, especially where the rotary method is used, and with it water is constantly pumped down the slender hollow shaft to cool the drill and to keep it from getting clogged with sand and pulverized rock, as well as to flush out the bore-hole. The type of hose used ranges from 2 to 2½ inches internal diameter, is made with a thick, tough inner wall, and generally has from five to eight plies, except at the ends of the 30 to 50-foot length, where it is reinforced with one or two additional plies of fabric to withstand coupling strain. All such hose has a protective armor, being closely wrapped with either round or half-round wire, commonly No. 6 gage, for rough handling. Some types for pressures of 250 pounds or more have flat wire wound through the cores to safeguard the hose further from grit abrasion and to prevent bends from straining it too much. For compressed air needs, many use plain wrapped duck or braided hose, 5 to 9-ply, with the core made of an oil-resisting rubber; but the demand is increasing for hose with wire armor, which gives added strength and longer life for rough work.

For conducting oil from tanks to barrels the hose most used has four or five plies of frictioned duck with the center lined with an oil-resisting rubber compound, and with a closely-set spiral flat wire extending through the core not only to protect the compound from possible corrosion but also to prevent the hose from kinking or collapsing through the high vacuum so often occurring in hose used for this purpose. For general oil conveying a hose is used that has four or five plies with a specially-made canvas lining to protect the rubber, and also a round or flat wire helix in the core to check sharp bending.

To draw oil from shore tanks to steamships or tankers, or to reverse the process, a suction and discharge hose of exceptional strength and caliber is employed. It has to be made to withstand the utmost extremes in weather, the harshest handling, continual contact with rapidly-growing masses of oil, and usually high pressure. Spun metal hose has been tried, but, while such hose may give fair service in selected cases, the big oil companies much prefer to put their trust in rubber. As they say, all transfers of oil cannot be made with ships moored to docks; often the big hose has to be stretched a long distance from the shore, and sometimes it has to be fastened to a string of floats in rough water when a ship cannot be brought near a wharf or where wharves are lacking. They must have a hose that will not break if it bends. If in using a spun metal hose in such cases the hose were to snap in two, as is always possible, such an accident would mean perhaps serious loss and delay to shippers and customers.

One type of suction and discharge hose which is considerably used on the Pacific Coast ranges in internal diameter from six to eight inches and often lasts a year with steady use. It has a heavy, oil-resisting cover, under which are four plies of 32-ounce duck frictioned fabric. Under the latter is a braided steel cable wound spirally, then four plies more of fabric, next a heavy rubber lining, then two layers of canvas frictioned on the reverse side, and finally a heavy galvanized iron flat wire helix for the core and so pressed into the canvas as to give quite a smooth bore throughout. Surprise is sometimes expressed that external wire winding is seldom used on such hose. The reason given is that it is not safe, as friction of the metal covering with stones or on concrete docks might cause a spark that would mean a disastrous fire. A few concerns, however, have in use a type of hose which has all the features of that just described (except the cable) and with a flat wire or rope wound around the outside but protected with a specially-treated canvas covering.

For oil discharge only, a 4 or 5-ply hose with a compact, smooth-bore rubber lining is ordinarily used. A more durable type is made of four plies of fabric, a heavy tubing compound, four plies more of fabric, and a heavy rubber lining. Some buyers require manufacturers to conform to the United States War Department specifications or to those of the Southern Pacific Railway, while many of the large oil companies buy only according to their own specifications.

GASOLINE HOSE

Some complaint has been made that gasoline sellers often use old or inferior hose in filling automobile tanks, with the result that particles of partly-dissolved or disintegrated rubber are drawn into the needle valves of carburetors, interfering with engine operation, and sometimes causing motor car owners much vexation and expense. Investigation, however, has revealed but little basis for such complaint. In a few cases at out-of-the-way stations some dealers may have used old garden hose temporarily in filling tanks, and some dissolved rubber from worn lining or joints may have given a few motorists annoyance, but the amount of such trouble has really been negligible. An increasing number of gasoline sellers use a hose nozzle having a 60 to 80 wire mesh strainer to catch lint, dirt, etc., that may be in gasoline. Experienced "gas" sellers say that if the nozzles are fastened in the hose to prevent the fluid from reaching the fabric, there will be rarely any disintegration trouble. As an improvement, some stress the need of couplings that when inserted in hose

will not perceptibly lessen the caliber or impede the flow of gasoline as do many now in use. Something in spun metal is suggested as the desideratum.

Most "gas" stations have very good rubber equipment, the operators having found that the best is the cheapest in the long run; and the big oil companies on the Pacific Coast, which operate long chains of stations, have standardized with a gasoline hose having a strong duck lining that quite effectively keeps the gasoline from acting on the rubber. Within such ¾ or 8-inch canvas core is a helical flat wire further to safeguard the rubber, and surrounding the rubber are four plies of fabric, and finally a heavy spiral of flat wire to keep the hose from bending sharply and to add to its wearing quality. This type of hose is exceptionally durable. The stations are also supplied with 5 to 7-ply air hose, a strong tubing with a rubber covering, and with the further protection of a spiral flat, round, or half-round wire.

FIRE HOSE

For emergency fire needs the oil companies equip their stations with a folding, unlined, linen duck hose that is easily packed away; but in their oil fields and at their refineries they always keep on hand a great amount of very flexible, double cotton-jacketed hose of from 2 to 2½ inches in diameter to meet an ever-present danger of conflagration. Some concerns, however, use in their fields, instead of cotton-jacketed hose, a good grade of rubber-covered rubber-lined fire hose made in four plies, with a fifth ply at each coupling.

PUMP VALVES, SLEEVES, AND PACKING

In the slush pumps of the oil fields rubber gets its severest test; and it is here that it is used quite exclusively for ready-made or wrapped-on sleeves for plungers. As these pumps must be used for cleaning out bore-holes after the sand in them has been flushed out with water, and must also do the hardest kind of service night and day in sucking up into the sump cisterns heavy oil often much mixed with grit, the rubber sleeves, varying in diameter from five to six inches and in thickness from ½ to ¾ of an inch, have to be made of specially compounded stock. Not only does the rubber sleeve aid in producing the requisite pumping vacuum, but to a considerable degree it also prevents the scoring of the pump cylinder by allowing the sand to work above the piston, which could scarcely happen if the plunger were wholly of steel, as plungers are at the refineries, where only strained oil is handled.

Sometimes in the pumping of crude oil the sleeves are changed as often as twice a day, while in other cases they may last a month or two if but little abrasive substance is drawn up from the well. Hence the life of the rubber sleeve varies with the character of the oil field and the earth strata through which the well has been driven. One make of sleeve for light service is of very pliable stock, and, when worn on one side, may be twisted inside out and used on the reverse side, thus giving double service and effecting a saving. Instead of sleeves many workers still use sheet packing, which, if of good quality and snugly fitted, gives very good service. Many use such packing only when short of sleeves.

Many are the varieties of rubber valves used for oil pumps, each manufacturer endeavoring best to adapt goods to the special needs of customers. The softer compounds are used where the pressures are below 80 pounds, while the tough, high density valves are utilized where the pressures range up to 200 pounds and the temperature reaches up to 212 degrees F.

Rubber packings for oil machinery range from the thin 2 and 3-ply stock to be cut by hand as needed to the special packing made to order and having a dozen or more layers of specially frictioned fabric cut transversely to the weave or on the bias, the advantages claimed for the diagonal cutting being that it wears longer, the fabric exposed thus is more compressible, and that it aids much in lubricating. A spiral packing much used for rods running in oil is made of tightly-woven asbestos with a rubber core.

A considerable amount of pipe rings, gaskets, casing cups, hose washers, split stuffing-box rings, swab rubbers, and oil-well packers are also consumed in the oil industry, being supplied in a practically endless variety of sizes, forms, and qualities. A great deal of trouble used to be occasioned on natural gas lines, especially those near the oil fields, by gasoline condensate collecting at the rubber joints in the iron pipe lines, and which neither the gas well pressure nor the pumping suction could wholly remove. The result was the steady deterioration of the rubber couplings and clamp rings, with much expense for renewals and loss in time and in gas delivery while repairs were being made. This difficulty has been quite overcome with couplings and clamp rings made of a special "gas" resisting compound, which, it is said, will remain unaffected by the condensate for five years or more.

One article which is manufactured in large quantities is brake-shoes that are used on heavy oil drilling machinery. These are made of a particularly tough rubber compound, in which are inlaid several layers of woven brass wire and thick asbestos fabric. It is claimed these are practically indestructible.

Nor does the foregoing enumeration of rubber needs in the oil fields take into account many other articles that are quite indispensable in the handling of oil from the time when the heavy, black fluid is drawn from the depths of the earth to the time when, highly-refined, it is finally delivered to the consumers. Such miscellaneous articles may include tires used on fleets of trucks, and the rubber boots and shoes, gloves and helmet hats worn by small armies of men working in rain and sunshine in fields fairly flooded with oil.

INTERNATIONAL CHAMBER OF COMMERCE ORGANIZED

The recent organization of the International Chamber of Commerce at Paris is the fulfilment of plans launched at the international trade conference at Atlantic City, New Jersey, a year ago, and further elaborated at the conference at Paris, France, in June. It is a voluntary body thoroughly representative of many nations ready to discuss and adjust such important questions as finance, raw material, production, shipping, unfair competition and numerous other phases of international trade.

Like the Chamber of Commerce of the United States, the constitution of the international body provides for submitting international trade questions of general and immediate interest to the membership for a vote. The referenda will be taken in the associate countries and the result published by the International Chamber.

There are two classes of membership, organization and associate. The annual dues of each class are fixed at three hundred francs, except that in the case of organizations this fee is used as a basis, and is a minimum charge for organizations entitled to only one delegate. Organization members will comprise national and local commercial, financial and industrial organizations representative of the interests they embrace. Associate members will consist of individuals, firms and corporations.

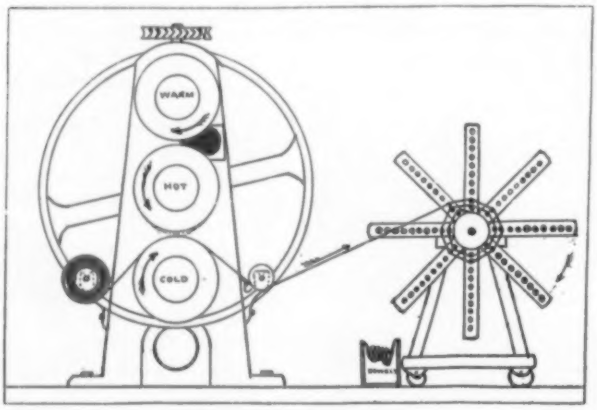
A board of three directors and three alternates is selected by each of the countries represented. The American directors are John H. Fahey, formerly president of the Chamber of Commerce of the United States, of Boston; Willis H. Booth, of New York, and Edward A. Filene, of Boston. The alternates are: Harry A. Wheeler, formerly president of the Chamber of Commerce of the United States, of Chicago; William Butterworth, of Moline, Illinois, and Owen D. Young, of New York.

Temporary headquarters for the new organization have been established at 33 rue Jean-Goujon, Paris, France. The permanent headquarters, which will be determined by the Board of Directors, will probably be located at the seat of the League of Nations.

The Manufacture of Rubber Plasters

A Little Known Industry

It will doubtless surprise many to know that certain very important sections of the rubber industry have never been affected by the discovery of vulcanization. That Goodyear, Hancock, Parks or Peachey and their discoveries interest them not at all. They do not know sulphur, sulphuret, sulphur chloride, accelerators, vulcanizers, steam presses nor dry heaters. Nevertheless, their rubber goods are found in the open market the world over, indeed are accepted as necessities everywhere.



Calendering and Reeling Porous Plaster Stock

The lines referred to are pharmaceutical preparations known as adhesive plasters. The plaster business operates fully equipped factories, employs standard washers, mixers, calenders and spreaders like any other rubber mill. There the likeness ends and special machines, adapted only for plaster work, are used.

As in all lines of rubber work, the manufacture of plasters entails individual problems. Although thousands of tons of rubber have been employed, only the sweet smelling or non-odorous types are usable. Hence Pará wild or plantation is the favorite. In preparing the plaster compound, not only must it be non-odorous, but a peculiar degree of adhesiveness is demanded. It must be sticky with the characteristic of remaining so and never drying out. Furthermore, the compound must contain drugs and medicaments in great variety and in definitely ascertained proportions.

MELTED RUBBER

So far nothing is more permanently adhesive than melted rubber. It is therefore not strange that in early plaster preparations it was used and most successfully. So sticky is it that cloth covered with thin films, although exposed to the sun for months, does not dry out at all.

The "lead plaster," in which melted rubber is used, occupies an important place in the pharmacopœia of the leading nations In the process of compounding it the rubber is dissolved in a fixed solvent, such as petrolatum, and then mixed with lead acetate (prepared as lead oleate) and spread upon fabric. The ingredients are used in the following proportions:

Rubber	2 volumes
Petrolatum	2 volumes
Lead oleate	96 volumes

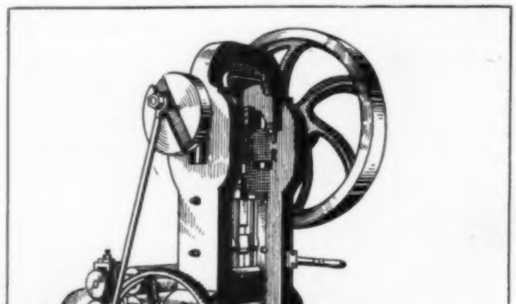
The rubber is first melted at a temperature of 302 degrees F., then the petrolatum is added and the same temperature maintained until the ingredients form a plastic mass. The lead oleate is next added and the heat kept up until the mass is quite fluid. The heat is then withdrawn and the mass stirred while cooling until it becomes firm.

The lead oleate is prepared by taking 10 volumes of granular dried soap, dissolving it in 35 volumes of hot distilled water and straining the solution. To it is then added six volumes of lead acetate dissolved in 25 parts of hot distilled water and afterward filtered. The solution is stirred thoroughly until a precipitate (lead oleate) has been formed. The water is drawn off and the lead oleate precipitate washed well with hot water and thoroughly kneaded on a warm tile to free it from water. The mass is then rolled flat, wrapped in waxed paper and kept in sealed vessels until used in combination with the rubber-petrolatum vehicle.

The melted rubber plaster was never manufactured to any extent in the United States. It had, however, quite a vogue in Europe. In manufacturing it, the only rubber machinery used was a washer and dryer, a kettle for melting the rubber, mixing slabs, for the other ingredients, and a spreader for applying the coating. The perforating, cutting, backing and packing was all done by hand.

PLASTER MILL EQUIPMENT

In the United States, however, where mustard, belladonna, capsicum, menthol, and various other plasters are popular, fully equipped rubber mills exist, having regulation washers, dry rooms, compounding rooms, mixers, calenders and spreaders. Nor do they melt the rubber. Instead, they so compound it that it remains adhesive for years.



Automatic Perforator for Porous Plasters

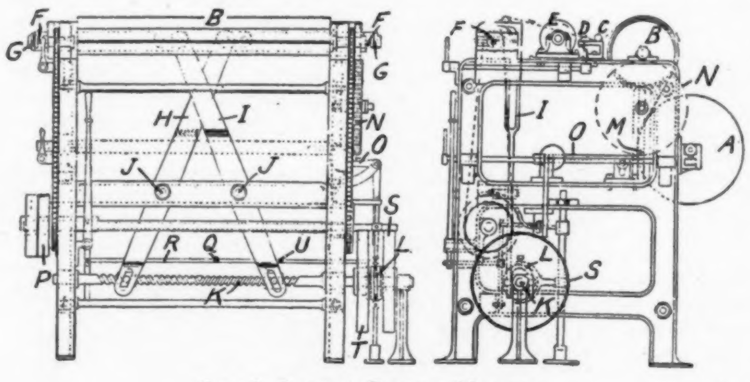
What is known as French plaster, consists simply of Pará rubber and essence of petroleum, with no medicament. This same compound serves as a base for mustard plasters, the mus-

tard flour being dusted upon the surface of the plaster after it leaves the calender or spreader.

For medicated plasters, various drugs, resins and waxes are employed. Thus, one formula for menthol plaster employs rubber, gum olibanum, orris root, menthol, Burgundy pitch, resin, and beeswax. An English formula calls only for rubber, Burgundy pitch, and gum olibanum. Another recipe specifies Pará rubber, Pontianak, birdlime (gluten), belladonna and paraffine oil.

POROUS PLASTERS

The preliminary operation in making plasters is preparing the gums, resins, and waxes. These ingredients are melted by a steam bath and strained for the purpose of removing all dirt and foreign matter. These are then mixed in a kettle with the medicinal agents required and then incorporated with the sheet rubber on ordinary mixing mills. Each batch is made proportionately for 100-gross lots of the regular size porous plasters. The rubber compound is next calendered upon a sheet of fine cambric. This has been previously dried and as it is free from size, the pressure of the rolls sets it firmly into the meshes of the cloth. As the sheet of coated fabric issues from the calender, the coated side is passed under an idler roller onto an octagonal



Blair's Surgical Bandage Machine

handling reel, as it is necessary to keep the adhesive surface free from contacts. Separate individual maple dowels are used in winding upon the reel. The sheet is left upon the reel until the surface is thoroughly cool. When cool, it is run through a strip cutter and cut into strips usually five inches wide, each strip being wound on a separate spool. The spools, holding 100 yards, are passed next to the perforating machines. These machines are specially built and are considered trade secrets. The ordinary plaster is 5 by 7½ inches, and in this area are some 240 one-eighth-inch perforations. The perforating machine cuts this number at once, and not only that, but puts on the light double strips of face cloth, folding their centers, cuts the plaster to size, and passes it along for finishing.

One machine handles about 50 plasters a minute, and in spite of the fact that the product is sticky beyond description, it runs smoothly and steadily day in and day out. Finishing consists in lightly pasting a square of backing cloth upon the reverse side of the plaster, and packing two dozen in a box for market.

NON-POROUS PLASTERS

It should not be forgotten that non-porous plasters also find a ready market. There is for example the tiny "plasteret," 1 inch by 2 inches for size and sold by the dozen. This is used for burns, scratches, bruises and as a ready means of repair, taking the place of gutta percha tissue.

The giant of all plasters, however, is the kidney plaster, more than a foot long, six inches wide and curved to fit over the kidneys. In these the rubber compound is spread upon soft moleskin, died out to shape, backed with a rectangle of cloth, when they are ready for market. The compound consists chiefly of rubber, capsicum and belladonna.

SURGEON'S ADHESIVE PLASTER

Perhaps the neatest, if not the most valuable of all, is the surgeon's adhesive plaster. The base is rubber—and good quality rubber. The only adulterant, or rather medicament, is zinc oxide. With the addition of a non-drying oil, this is the whole compound. This tape comes upon the market wound on spools of various sizes so that almost any length or width can be found in the ordinary drug store. In manufacturing, the coated cloth is wound from the calender upon mandrels and cut into short rolls on an automatic lathe. These rolls are then fed into a machine similar to a grommet setter, which forms a metal spool through and around the roll. It is then put in a tiny carton and is ready for market.

BANDAGE CUTTING AND WINDING MACHINE

In this connection a detailed description of Blair's machine for cutting and winding surgical bandages in any width is interesting. The sheet of rubber, wound on a roll *A*, passes over the measuring roller *B*, under a bar *C* and over the bar *D* which removes the wrinkles, and keeps it taut edgewise. It is then passed over a series of rotary cutters *E*, and the separate strips are wound on a pair of spindles *F* and over a loose wire laid alongside the spindles. These spindles are placed end to end and are drawn apart or separated by the sliding pieces *G*, which are moved by levers *H* and *I* pivoted at *J*. The lower ends of these levers are attached to the right and left-handed screw *K*, which is operated by the main belt drive through the jaw-clutch *L*.

In operating the machine, the spindles *F* wind up the cut bandages, until a notch *M* in the wheel *N* comes against the end of the rod *O*, causing the driving belt to be shifted to the loose pulley *P*. This engages the clutch *L*, causing the screw *K* to revolve and the levers *H* and *I* to separate the spindles *F*. The rolls of bandage then drop off and remain hanging on the wire. The lever *I* comes against the stop *Q* on the bar *R*, throwing the clutch *L* out of gear with the wheel *S* and engaging it with a wheel *T* which revolves the screw *K* in the opposite direction, bringing together the spindles *F*. Another stop *U* on the bar *R* causes the clutch *L* to be moved midway between and out of gear with the wheels *S* and *T*. The finished bandages are cut off, another loose wire is laid against the free hanging ends of the cloth, which are placed on the spindles, and the machine is again set in motion.

CORN PLASTERS

In speaking of adhesive plasters it would not do to ignore those that bring comfort to the pedal extremities. They are of ancient origin and have attracted the inventive genius of such notables as Sir Humphry Davy and Sir Astley Cooper. To be sure, their formulas, salt of sorrel and potash or yellow wax and verdigris, are no longer used, but they paved the way for the present sanitary effective rubber corn plaster.

The compounds used vary but little. A well known one follows:

	Per Cent
Extract of cannabis indica	10
Resin compound	70
Salicylic acid	20

The last named is the non-drying rubber base, practically the same that is used in porous plasters. The compounding is done as in other plaster work and so is the calendering and general

handling. The rubber compound is spread upon a sheet of thick, soft felt. The simpler forms, cut in a die press, are backed with protective cloth and are ready for market. They are in two shapes, round for corns and oval for bunions. A more modern type has as an addition a strip of fabric, coated on one side with rubber compound and placed over the toe in the felt plaster, where it, together with the backing cloth, protects the dab of paste that softens the corn, the rubber-coated circular felt pad acting simply as a guard. In the manufacture of this type an automatic machine cuts the strips, puts the dabs of paste in the right place, sticks the felt pad just where it belongs, and finishes by adding the strip of backing cloth.

MOVING PICTURES OF BUSINESS RECORDS

What we call the moving picture is not, properly speaking, a moving picture at all. It is merely a sreies of pictures each of which is seen at such a short interval after the preceding one that the image of one does not fade from the vision before the next picture appears. It is this rapid succession that gives the appearance of continuity and motion. The same pictures when not seen in rapid succession do not give as vivid and clear an impression.

In much the same manner, data from business records, arranged in columns or tables and explained by text, does not give the clear impression that it would if reduced to picture form. If all the data can be connected in such a way as to give the appearance of continuity, showing the relation of one item to another, then practically the same result has been secured in regard to business records that the motion picture secures in regard to pictures.

Various methods are now in use for reducing business records to picture form. Some are simple and some complicated. Some serve their purpose admirably and some are deceptive. The best of them blend the different data together in much the same manner as the moving picture. They show exactly what is going on, and whether the business is going ahead or behind. A study of the pictured record shows what to do to increase profits. There are many features of the business that show up which would be overlooked without these records.

These records serve their purpose in much the same manner that a motion picture of a growing plant shows plant growth. If one watches a flower grow, there are sure to be many details of that growth which he either does not notice or fails to remember. However, suppose that at proper intervals a picture of that plant is taken, the exposures extending over a period of many weeks. When they have been completed and the picture projected upon a screen, every detail of growth is seen. It is the continuity that gives the motion picture its great value. It is the continuity of properly made graphic charts, curves, maps, etc., that gives them their value.

Photographic moving pictures have served science and business in many ways. For example, pictures are taken showing the action of automobile and truck tires under various conditions of load and road conditions. These are taken at as rapid a rate as possible. They are then projected at a very much slower rate and every detail of the motion and the action of the tires at once becomes clear and vivid.

Again, photographic records may be made of the motion of machines, workmen, factory operations, anything that it is desired to study. These can then be studied in far greater detail than would be the case if attention was confined to the machines, workmen, or factory operations. The motion picture gives a record that is superior, so far as research is concerned, to the actual thing or person studied.

Curves, charts, etc., serve exactly the same purpose in the study of business records that the moving picture serves in studying all types and kinds of motion. These give a continuous record of the growth of days, weeks, months or years in such form that trends, effects, causes, everything that affects the business may be studied with detailed accuracy. Information is gained that could not possibly be gained in any other way. No one could possibly study the same data in printed or written form and be able to see as clearly the cause and effect, the trend and the probable future results.

The electric lighting business, which has grown from nothing to a very large and a very important industry during the last forty years, is an example of what picture records can accomplish. In this business question of rates was an exceedingly important one. Unless the current could be sold at a sufficiently low price it would not be possible to sell it. Cost of production, market possibilities, and all other features bearing upon the proposition were reduced to picture records. These were studied. New rates were established. Their effects were studied by means of new picture records. Those companies which made the greatest use of picture records have invariably been the ones which have enjoyed the greatest degree of prosperity.

Moving pictures of business records, that is, charts, curves, maps, and the like, that show a continuity similar to that of the photographic motion picture serve the business man as nothing else can. They give accurate related data. Data that is unrelated does not always convey the correct impression. For example, a table showing the cost of living and how it has increased during the past few years may be decidedly misleading. Make a curve showing the change in the cost of living during the past half century and on the same sheet draw another curve showing average earnings of any particular class of people and the result is accurate related data that tells the truth. It is a moving picture that shows all the details in a manner that they could not be shown by tables and descriptions, any more than could the growth of a plant be pictured by tables and descriptions as accurately as it could be by the motion picture.

There is no other way in which the relation of cause to effect can be shown with equal clearness. Make a graphic representation of the effect and also one of the causes and the relation becomes transparently clear. As an example, make a picture of commodity prices over any given period. Suppose it is made from the period just preceding the Civil War up to the present time. Also on the same sheet make a graphic representation of the number of men killed in war, and the value of property destroyed, the percentage of population in arms and the like. The result is a perfectly clear representation of the relation of war to the variation in the cost of commodities. Such a moving picture will show what to expect during the coming years, as it reveals the relation between cause and effect and the basic cause of the present general price changes.

Graphic records save an immense amount of time and make it possible to secure data at a glance which would otherwise require wading through a great mass of statistics. They save time in exactly the same way that moving pictures save time in studying the growth of plant life. All this time saved is available for planning bigger and better things in the future. It does not have to be devoted to learning what has actually happened in the past or what is happening at the present time. A single glance gives most of this information. A few minutes of study gives more information than hours of concentration could possibly give without these picture records, these graphic charts, curves, maps, etc., that give true motion picture continuity to business records.

The Svenska Galoschforsaljnings Aktiebolaget, Stockholm, Sweden, wholesale dealer in rubber shoes, has increased its capital to 180,000 kroner.

The Development of Pneumatic Truck Tires and Tire Equipment

Why Use Pneumatic Tires for Motor Trucks?[1]

By W. E. Shively[2]

EVERY DEVELOPMENT in the transportation industry has been toward a faster, more reliable or cheaper method of transporting men and materials. No one will deny that the motor truck is a very significant development in the transportation system of the world. This was conclusively proved in the world war. Most of us are of the opinion that the motor truck is destined to become the most important factor of our transportation system, judging by the events of the past two years. The development of the motor truck has been limited by the solid tire.

At first, solid tires were used on all but light delivery trucks. On every other type of highway motor vehicle, the limitations of the solid tires were soon discovered and the solid tire was replaced by the pneumatic tire. But the tire manufacturers had not kept pace with the development of the motor truck, inasmuch as they had not perfected a large enough pneumatic tire. Tire engineers, however, were among the first to recognize the shortcomings, and proceeded to develop a large single pneumatic tire for motor-truck use.

Discussion of the relative merits of pneumatic and solid tires must of necessity reduce itself to a comparison of the elasticity of compressed air with that of rubber. We think of rubber as a very elastic substance, but it cannot be compared to compressed air in this respect. The reasons that motor trucks can be operated with any degree of success on solid tires are that they are operated at relatively low speeds and are built so heavy that they will endure the shocks and vibration to which they are subjected.

Two fundamental advantages result from the use of pneumatic tires on trucks, increased cushioning and increased traction. Increased cushioning is the most important factor, because it has a greater effect on the performance of the truck. The cushioning ability of a pneumatic tire is four times that of a solid tire of the same carrying capacity. As a result of this six distinct advantages are gained from the use of pneumatic truck tires: (1) faster transportation, (2) economy of operation, (3) less depreciation of fragile load, (4) easier riding, (5) less depreciation of roads, (6) lighter weight trucks.

TRANSPORTATION AND OPERATION ECONOMIES

Faster transportation or quicker deliveries result from the increased cushioning of pneumatic truck tires because it is possible to obtain greater maximum and minimum speeds. Manufacturers of solid-tired trucks remove their guarantee if a speed of 11 or 12 m.p.h. is exceeded, while pneumatic-tired trucks are being operated at 20 to 35 m.p.h.

Table I shows the increased mileage obtained with pneumatic tires by four truck operators.

TABLE I

Details	Operators[3] A	B	C	D
Truck capacity .... *tons*	2	3½	2	2
Period, months	6	1	5	4
Mileage on pneumatic tires.......	6,414	1,995	5,510	7.014
Mileage on solid tires.......	4,476	675	2,223	4,677
Miles per gallon of gasoline on pneumatic tires	5.77	5.75	7.21	7.70
Miles per gallon of gasoline on solid tires.....	3.98	4.77	5.43	7.10
Miles per gallon of oil on pneumatic tires....	104.00	32.00	55.00	152.00
Miles per gallon of oil on solid tires.......	59.00	30.70	54.00	78.00
Cost per mile on pneumatic tires,....... *cents*	45.00	31.30	21.50	27.70
Cost per mile on solid tires....... *cents*	56.30	55.00	24.00	31.00

[3] With a 2-ton truck for a 9-month period, a fifth operator obtained 9.1 miles per gallon of gasoline on pneumatic, and 6.1 miles per gallon on solid tires.

The economy of operating trucks on pneumatic tires has been shown by the experience of many users. There is a considerable saving in gasoline, oil and upkeep. The saving in gasoline in the case of five truck operators is shown in Table I; also the saving in oil consumption, probably due to the decreased vibration in all of the moving parts of the truck.

The upkeep or repair cost of a truck operated on pneumatic is much less than when operated on solid tires. It can be attributed to the decreased amount of vibration and the absence of severe shocks and jolts. The estimated saving is from 25 to 50 per cent. Regarding depreciation charges, as a result of experience, Goodyear solid-tired trucks are depreciated on the basis of 60,000 miles of service, while the pneumatic-tired trucks are depreciated on a basis of 80,000 miles. In my opinion the 80,000 miles is too low, because there have been Goodyear trucks on pneumatic tires which at the end of 250,000 miles were still in good running condition. I believe that in the near future trucks will be depreciated on the basis of 100,000 miles.

DEPRECIATION OF LOADS AND ROADS

This is now considered by many to be one of the most important advantages. In hauling fragile materials such as bottled goods and eggs, there is very little, if any, breakage. Then there is the easier riding made possible by the use of pneumatic tires. In the case of delivery trucks, the elimination of the vibration makes it possible for the truck driver and his helper to ride almost continually without fatigue. This is of vital importance where it is necessary to drive for hours at a time. Easy riding is absolutely essential in passenger buses, from the standpoint of both comfort and speed.

Increased traction is made possible by the greater width of the pneumatic tires, their non-skid treads and their greater flexibility, which allow the surface of the tire to conform more nearly to the unevenness of the road, thereby getting a better grip. As a result of this increased traction, we obtain reliability and safety. By reliability is meant that it is possible for the truck to operate successfully over almost any kind or condition of road, and during all seasons of the year. By safety is meant that, because of the increased traction of the tires, the truck will hold the road better and the brakes will be more effective. This point has been thoroughly proved by the experience of many users of pneumatic truck tires. In traveling over the mountains along the Lincoln highway during the winter, this increased traction has saved both drivers and trucks from serious accidents on numerous occasions.

COST OF PNEUMATIC TIRE EQUIPMENT

While it is true that the initial cost of truck pneumatic-tire equipment is greater than that of solid-tire equipment, it has been proved by experience that this difference is more than offset by the greater earning power and the lower costs of operation. It has usually been found that in from four to six months the increased cost of the pneumatic-tire equipment is completely wiped out. When specially designed pneumatic-tire trucks make their appearance, this increased cost of pneumatic-tire equipment will be offset.

As to possible loss due to injury or abuse of the tires, it has been found that this is not a serious objection. There are many instances where pneumatic truck tires have run from 12,000 to

[1] Abstracted from Cleveland-Detroit Sections paper, The Journal of the Society of Automotive Engineers, October, 1920.

[2] Development engineer. The Goodyear Tire & Rubber Co., Akron, Ohio.

20,000 miles on the original air. Repair molds and retreading equipment are now in use in many parts of the country, and are being placed in other localities as rapidly as possible; so, it will be no more difficult to have a pneumatic truck tire repaired than any other part of the truck.

PRACTICABILITY OF PNEUMATIC TIRES

The practicability of pneumatic truck tires has been questioned probably more than anything else. The first thing to be discussed under this subject is that of delays due to changing tires. In the case of detachable rims, where it is necessary to remove the tire from the rim, replace it and then inflate it, it does not require more than 30 minutes to perform the entire operation. In the case of a demountable rim, a change can easily be made in 15 minutes. The average truck driver is not required to make a tire change more than once in three months.

Most garages and service stations carry sufficient air pressure to inflate tires up to the 42 by 9-inch size, and many can take care of the larger sizes. By the time the largest tires are in general use, there will be sufficient air pressure to keep the tires properly inflated. Trucks equipped with detachable rims, or operating in long-distance or inter-city service, are usually equipped with small air compressors. These trucks experience no difficulty in securing sufficient pressure. One objection, which is not mentioned so much now as when pneumatic truck tires first made their appearance, is the danger of the high inflation pressures. Pneumatic truck tires are made to withstand three to four times the pressure carried in them, so that this objection must be passed to the rims. These are made to withstand many times the pressure carried in the tires. If the rims are properly assembled, there is small chance of accident.

Regarding the rise in pressure caused by the heating up of the tire, we have operated these large tires under the most severe conditions possible and in no case have we found an increase in pressure of more than 35 pounds per square inch. If the tires are made to withstand three to four times the pressure at which they are operated, it is hardly possible that this additional 35-pound pressure will cause them to blow out.

The large outside diameters of the tires are often objected to because they affect the truck ability and because they raise the center of gravity of the truck. In changing over a solid-tired truck to pneumatic tires, there is the possibility of reducing the ability of the truck. Our experience has shown that unless the truck is operated over a very hilly route, its ability has not been noticeably affected. Looking into the future, this question of truck ability and gear ratios will be taken care of by changes in design; so, the question of change-overs is only temporary. Raising the center of gravity of the truck is not as serious as it might seem.

Data on Pneumatic Tires and Rims Used on Trucks[1]

By Burgess Darrow[2]

The object of this paper is to familiarize truck engineers, and others interested in truck design, with facts and opinions which will assist in providing correct pneumatic tire and rim equipment for trucks. The sizes which have been worked out during the past six years, and which are now standard, are as given in Table I.

Table I. Sizes of Pneumatic Tires

Rim Sizes, In.	Normal Tire, In.[3]	Oversize Tire, In.[4]	Extreme Maximum Allowable Load per Tire (Cord), Lb.	Inflation Pressure, Lb. Per Sq. In.
34x5	34x5	36x6	1,700	80
36x6	36x6	38x7	2,200	90
38x7	38x7	40x8	3,000	100
40x8	40x8	42x9	4,000	110
40x8	42x9	....	5,000	120
44x10	44x10	....	6,000	130
48x12[5]	48x12	....	8,500	140

[3] Original equipment on new trucks.
[4] Not for original equipment; only for consumer's convenience.
[5] Not yet standard with S. A. E. practice.

Table I also gives the rim sizes, normal tire sizes and the tires which can be fitted as oversize. It shows that there is no oversize possibility when 9, 10 and 12-inch sizes go out on new trucks, because the oversizing plan falls down above the 9-inch size, on account of the size and stiffness we are forced to build into the beads as designed at present.

LOADS AND INFLATIONS

To the best of our knowledge tires give best average satisfaction in the way of plenty of cushioning and not too much flexing. Flexing breaks down a tire, when run under conditions which produce a deflection in the tire of from 12 to 15 per cent of the section diameter, or the height above the rim. The deflection can be controlled by regulating the load or the pressure, or both. Table I also gives the standard maximum loads and the inflation pressures. These inflation pressures are practical to maintain, the tires are built accordingly and we get satisfactory, practical results in first cost and mileage delivered if they are used.

In reference to underinflation and overload, both evils result in an excessive deflection of the tire. This means that an excessive shearing action is put on the rubber between the plies of the tire, and also on the cushion built into the tire between the tread and the plies, which in turn results in a separation of the parts and starts the tire on the road to failure.

Table II. Weights of Tire Equipment

Tire Size Inches Front	Tire Size Inches Rear	Weight, Pounds	Remarks
6	6	72	Weights of tires alone, without wheels or rims, but including tubes and flap.
7	7	87	
8	8	119	
9	9	174	
10	10	246	
12	12	398	

TUBES, FLAPS AND VALVES

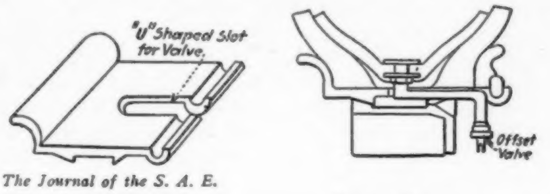
Tubes for pneumatic truck tires must be designed and compounded to retain as much of their original strength and shape as possible, after being subjected in service to more or less heat and to continued flexing. The tube has been one of the most difficult problems in connection with large tires, but has been solved partly in a mechanical way by building the tubes thick, shaped like the tire, and so they are stretched very little in the tire. The tube problem has been solved to a still greater extent by rubber compounding. Tubes are on a par with the casings in development and render satisfactory service even in the largest sizes.

Flaps assume considerable importance in tires inflated to the pressures we recommend for truck tires. It is important that the flap should fit well, so there will be no adjustment of the flap when the tire is inflated, causing a localized stretch in the tube at the edge of the flap.

The valve question had to be approached first from the standpoint of holding air at pressures from 90 to 140 pounds per square inch and, second, from the standpoint of ease of tire change. The valve insides on all 6-inch and larger tubes is of

[1] Abstracted from Cleveland-Detroit Sections paper, The Journal of the Society of Automotive Engineers, October, 1920.
[2] Development department, The Goodyear Tire & Rubber Co., Akron, Ohio.

a heavy-duty type, different from the ordinary valve insides in construction, but the two are interchangeable in any valve stem. On the 10 and 12-inch sizes, which inflate to 130 and 140 pounds



The Journal of the S. A. E.

FIG. 1. SLOTTED RIM OFFSET VALVE

per square inch respectively, even the heavy-duty type is unsatisfactory when used alone; so, a combination is used in the form of a heavy-duty valve insides and a needle-valve operated by a hand screw.

As to the relation of the valve to easy tire changing, it is customary in applying the small-size tires to insert the valve in the hole in the rim and tip the tire on the rim. This necessitates considerable clearance in diameter of the tire beads over the rim and then fish the valve through the valve hole. To avoid this difficulty some steel wheels are made with a U-shaped slot from the edge to the center of the rim, which permits the tire to go on the rim with no difficulty at the valve. (See Fig. 1.) We believe an offset valve with two right-angle bends in it, will eventually be used. The offset valve requires only a depression in the rim from the edge to the center, and not a slot. The wheel is stronger than if slotted, and besides making application just as easy, the valve comes out at the edge of the rim and is more accessible to inflate.

DUAL PNEUMATIC TIRES

The arrangement of tires on the trucks presents three possibilities; the ordinary truck with giant tires on four wheels, dual pneumatics on the rear, and trucks with six or more wheels. We look unfavorably only on the dual pneumatics, that is, two tires on the same wheel. Dual tires do not share the load equally because the inflation is seldom kept alike in both tires. Because of crowned roads, and more particularly rough roads, one tire takes more than its share of the load temporarily and this will injure the tire. An exaggeration of this condition is when one tire goes flat and the other takes all the load without

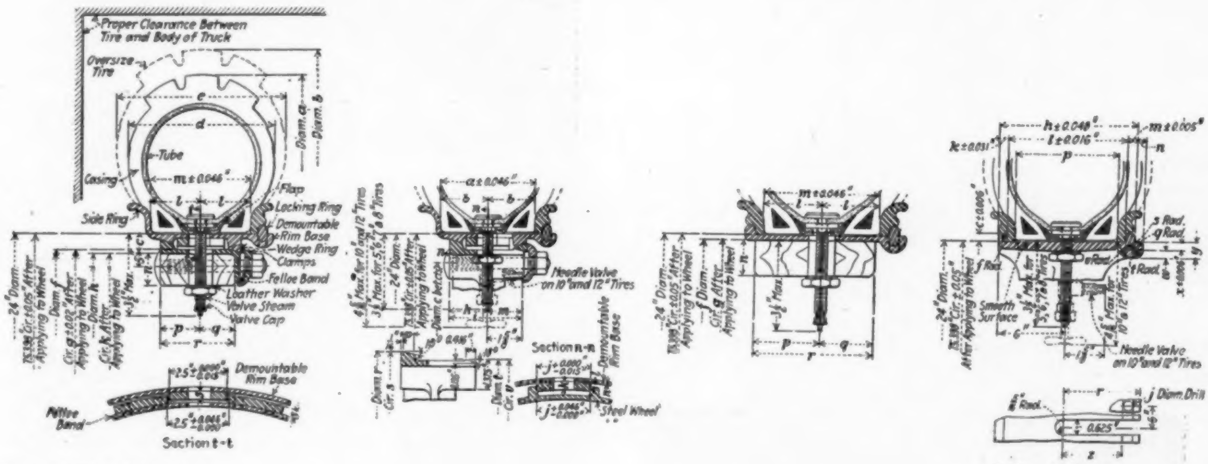


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FIG. 2. EXAMPLES OF THE APPLICATION OF PNEUMATIC TIRES TO MOTOR TRUCKS

FROM LEFT TO RIGHT ARE SHOWN A DEMOUNTABLE RIM, A DEMOUNTABLE RIM AND A STEEL WHEEL, A DETACHABLE RIM ON A WOOD WHEEL AND THE PNEUMATIC TIRE APPLIED TO A CAST STEEL WHEEL

and, in 7-inch sizes and above, such design is impractical because the rims are wide and would necessitate too much clearance in bead diameter.

It is therefore necessary if a straight valve and the usual valve hole is used, to push the valve up into the tire, fit the tire on the rim and then fish the valve through the valve hole. the knowledge of the driver. The tire which still holds air is so badly overloaded that it is sure to be injured, if not ruined. Changing an inside tire, in the case of dual tires, necessitates removing both. Dual tires are too easily abused and prove more expensive than either of the other possibilities.

What Motor Trucks Need to Supplement Pneumatic-Tire Equipment[1]

By E. W. Templin[2]

THE introduction of the pneumatic tire for motor trucks would have a material bearing upon the design of the truck itself, to get the most good from the use of such a tire.

TABLE I. ROAD SPEEDS

Present Solid Tire Gear Ratios	Average Governed Speed, m. p. h.	Capacity, Tons	Pneumatic Tire Speed m. p. h.
7 to 8	17	1 to 1½	30
9 to 10	15	2 to 2½	30
11 to 12	13	3½	25
12 to 13	10 to 12	5	25
14 to 16	9	7	20

Tire Size, In.	Rear Wheel r. p. m.	Drive r. p. m.	Pneumatic-Tire Rear-Axle Gear Reductions
36 to 38	280.0 to 265.4	1,450	5.18 to 4.47
40 to 42	252.1 to 240.1	1,325	5.26 to 5.52
38 to 44	221.1 to 191.0	1,200	5.43 to 6.28
40 to 48	210.1 to 175.0	1,200	5.72 to 6.86
42 to 44	160.1 to 152.8	1,200	7.50 to 7.85

The main factors bearing upon the problem of truck design for pneumatic tires are as follows: (1) speed, including road and

[1] Abstracted from Cleveland-Detroit Sections paper, The Journal of the Society of Automotive Engineers, October, 1920.
[2] Motor-truck engineer, The Goodyear Tire & Rubber Co., Akron, Ohio.

engine speeds, rear-axle gear reduction and air brakes; (2) traction, including engine torque and transmission gear reductions; (3) shock effects, including stresses introduced and the necessary factor of safety of sprung and unsprung parts; (4) emergency equipment, including tire pumps and spare tires.

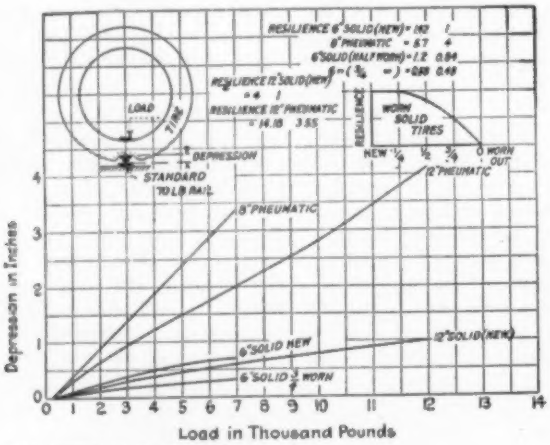

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Fig. 1. For a Given Load the Pneumatic Tire Deflects Four Times as Much as a Solid Tire

Table I shows road speeds that we consider satisfactory, together with the usual rear-tire specifications for various sizes of trucks. The engine speeds are figured on the basis of 1,200 feet per minute piston speed, which can be considered a good average. Higher speeds set up considerable vibration and add discomfort to driving.

SHOCK EFFECT

Fixing of allowable stress requires an investigation of the cushioning effect of pneumatic as compared with solid tires.

Fig. 1 shows the rate of deflection of pneumatic tires and corresponding solid tires, together with a curve showing how the solid tire depreciates in resilience with age and wear. It will be seen here that for a given load the pneumatic tire deflects four times as much as a solid tire.

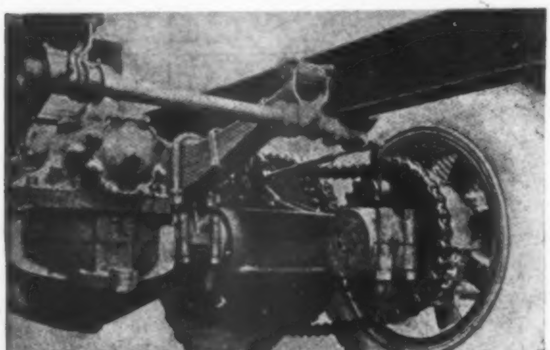

Fig. 2. First Application of Four Small Tires to Rear Wheels

COST

I believe it is possible to build a 5-ton motor-truck chassis equipped with pneumatic tires for only $200 to $300 more than a corresponding solid-tire truck, and that the net weight reduction may be easily 1,000 pounds without resorting to aluminum where it is not yet considered commercially practical.

SIX-WHEEL TRUCK

On account of the large size and weight of the 48 by 12-inch pneumatic tire, we were brought to consider the application of four smaller tires to the rear of the truck, instead of two of the excessively large ones. Our first attempt at an arrangement for applying four small tires to the rear without using dual tires, which is considered out of the question, is shown in Fig. 2. It consisted of a more-or-less standard rear axle with a walking beam adapted to each end and the wheel mounted upon trunnions from this walking beam, the springs being mounted upon the axle and attached to the frame on the inside. Chain drive was made use of in this case, which is about the only feasible drive with this arrangement. This construction ran successfully for about 10,000 miles before serious failure occurred. We were, however, inconvenienced with the chains jumping off and were not able to get a brake mechanism that would work. The main point against this design was its enormous weight; however, it served to show us that satisfactory tire mileage could be secured from such an arrangement and that there was a good possibility of adapting four small tires to the rear wheels. To further develop this point, we built up the tandem axle construction as shown in Figs. 3 and 4. This construction appears to have good possibilities and has at present operated some 3,300 miles, 1,000 to 1,200 miles over rough and uneven country roads, so rough in fact that it was difficult to keep the front springs tight. Fig. 5

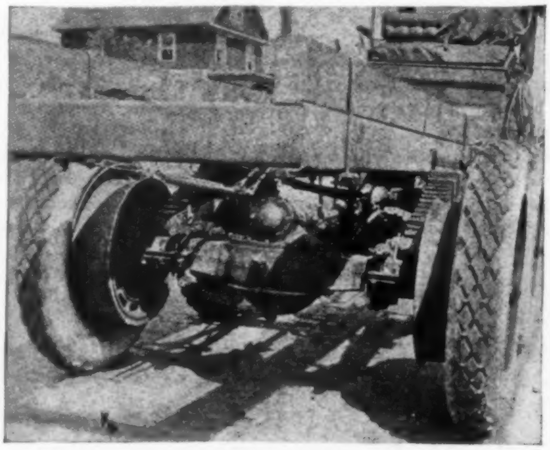

Fig. 3. Further Developments of the Tandem Axle Construction

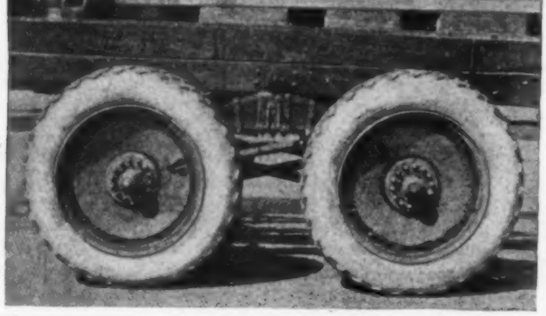

Fig. 4. Another View of the Tandem Axle Construction

indicates another very feasible design to adapt the tandem axles.

Some of the advantages of the six-wheel truck over the regular type of the same capacity, on 48 by 12-inch pneumatic tires and on the regular equipment of solid tires, are that compared with the pneumatic-tired four-wheel truck the saving by using four smaller tires is sufficient to purchase three or four complete spares, or approximately $500 per truck. Regarding ease of handling, each 40 by 8-inch tire weights only 119 pounds, whereas each 48 by 12-inch tire weighs 398 pounds. Carrying a spare tire

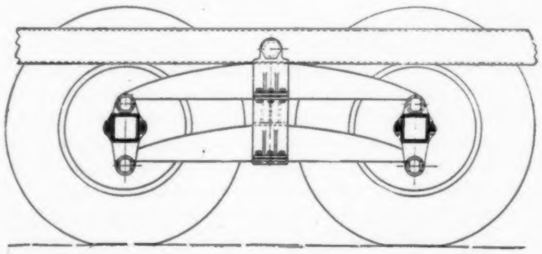

FIG. 5. A FEASIBLE DESIGN FOR TANDEM AXLES

in each case, the reduction in axle cost, the use of two rear axles in tandem results in the advantage that small axles are normally in large production, with consequent lower costs, whereas large sizes are made only in small quantities, with extremely high costs. The actual saving amounts to about $120 per truck. As regards weight saving, four 8-inch wheels with brake drums, etc., weigh 77 pounds more than the same equipment for a 12-inch tire. The total saving in weight is 814 pounds.

Considering traction qualities, the area of contact of four 8-inch pneumatic tires upon the road is about 27 per cent greater than that of two 12-inch pneumatics. This additional surface, keeping the tires from sinking in soft places, gives better traction when most needed and, in ordinary service, the additional area gives them a better chance to take hold. As compared to solid tires in winter service, off of paved roads, the four pneumatic tires have all of the advantage.

The four-wheel combination has about the same advantageous effects over single-axle construction that the pneumatic would have over solid tires, in regard to economy. With the four-wheel combination, when passing over an obstruction in the road, the chassis is raised only one-half the distance it would be raised in the regular type of construction. This reduces the acceleration of bodies upon the chassis to one-fourth that with ordinary construction. Thus, by reducing shocks and vibration, the number and cost of repairs, due to crystallization, fatigue of metal and the like, are reduced by a large percentage. The tandem construction makes for such exceptional riding qualities that a glass, filled to within an inch of the top with water and attached to the rear of the six-wheel truck, lost none of the water even when running over a decidedly rough road.

The most destructive factors of the operation of vehicles upon pavements are the wheel load and the wheel thrust. By referring to Fig. 6 one can see that a heavy wheel load causes the road to fail by breaking through the pavement. If, as is the case with the tandem construction, the wheel loads are cut in two, the chances are that the wheels will seldom find spots in the pavement weak enough to break through under this reduced load, even if a 5 to 7-ton load be carried on the truck.

The twin-axle combination has a decided advantage over both regular pneumatic-tired and solid-tired types in that four brakes of 21-inch diameter are used in place of two brakes of 21-inch diameter. The six-wheel truck has a greater operating radius.

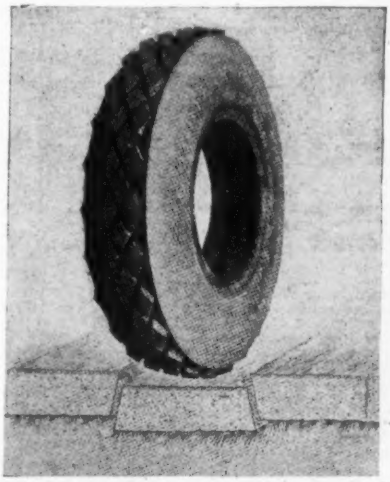

FIG. 6. A HEAVY WHEEL LOAD BREAKS THROUGE THE PAVEMENT

Pneumatic tires permit of an increase of average speed to double that of solid tires, and the combination of four small tires on the tandem rear-drive wheels will permit of increased minimum speeds on bad roads.

Pneumatic-Tire and Motor-Truck Development Experiences[1]

By M. D. Scott[2]

TABLE I gives a summary of the truck development obtained over a period of two and one-half years. Picture a truck weighing 15,800 pounds and carrying a pay load of 3,850 pounds, as against a truck weighing 8,000 pounds and carrying a pay load of 7,000 pounds. This has all been brought about through the use of pneumatic tires, thereby being able to carry a much heavier load on a much lighter truck and, as pointed out before, on a smaller sized tire, automatically increasing the earning power of the truck.

TABLE I. SUMMARY OF PNEUMATIC-TIRE ACCOMPLISHMENT[3]

Body and Chassis Weight, lb.	Pay Load, lb.	Increased Pay Load; Decreased Ton-Mile Cost, Per Cent
15,800	3,850	(Basis, 100 per cent)
12,700	4,800	24.7
11,900	5,800	50.6
10,560	6,800	76.6
8,000	7,000	81.8

Period, 2½ years

But the end is not in sight. We have succeeded only in proving that commercial trucks are uniformly built unnecessarily heavy for use with pneumatic tires and that, when pneumatic tires are used, weight can be materially reduced and the pay-load capacity increased. We have also shown that the lessening of the weight in turn allows the use of a smaller and less expensive tire for the increased pay load. We prove that more can be carried on a light truck when it is hauled on air, and that pneumatic tires permit a light truck to haul a larger load. This all helps to sustain our contention that pneumatic-tired trucks will use less gas, have smaller repair bills and generally give better satisfaction.

The following tabulation shows the performance of a fleet of pneumatic-tired trucks covering a period of six months:

[1] Abstracted from Detroit-Cleveland Sections paper, The Journal of the Society of Automotive Engineers, October, 1920.

[2] The Goodyear Tire & Rubber Co., Akron, Ohio.

TABLE II. WINGFOOT HIGHWAY EXPRESS

Year 1919	Trucks Actively Operated	Fleet Mileage	Total Ton-Mileage	Through Loading Capacity Per Cent	Operating Cost	Overhead Cost Cleveland Terminal	Total Operating Cost	Cost Per Mile	Cost Per Ton-Mile	Pay Loads Hauled, lb.	Revenue	Profit	Truck Efficiency Miles per Gal, Gasoline	Truck Efficiency Miles per Gal, Oil
April	6	12,066	32,483	78	$5,089.03	$654.28	$5,743.31	$0.42170	$0.15670	1,450,704	$6,522.32	$779.01	...	...
May	8	14,904	37,868	78	5,905.22	689.10	6,594.32	0.39620	0.15590	1,864,235	7,962.70	1,368.38	...	...
June	9	12,984	32,242	80	5,529.95	601.40	6,131.35	0.42590	0.17150	1,674,669	7,099.30	967.95	...	...
July	8	12,613	33,365	85	5,259.04	676.53	5,935.57	0.41690	0.15760	1,733,570	7,620.46	1,684.89	...	...
August	8	13,660	36,140	81	5,545.71	629.84	6,175.55	0.40600	0.15345	1,684,181	7,331.67	1,156.12	...	...
September....	7	15,479	40,185	78	5,201.38	601.16	5,802.54	0.33603	0.12940	2,083,383	9,371.69	3,569.15	...	...
Totals	..	81,706	212,283	..	$32,530.33	$3,852.31	$36,382.64	......	......	10,490,742	$45,908.14[4]	$9,525.50	...	...
Average ...	7.7	13,617	35,381	80	$5,421.72	$642.05	$6,063.77	$0.40045	$0.15409	1,748,457	$7,651.35	$1,587.58	5.93	143.3

[4] Gross earnings, 51.9 per cent on the investment, 26.2 per cent on the operating cost.

Operating costs and efficiency of solid and pneumatic tire equipment are compared in the following tabulation:

TABLE III. SOLID VERSUS PNEUMATIC TIRE EQUIPMENT

Details	Pneumatic Truck Tires A-30	Solid Truck Tires A-33
Type, tons	3½	3½
Total travel, miles	7,054	6,548
Number of round trips	89	83
Average mileage per trip	79.3	78.5
Hauling, ton-miles	19,188	17,632
Loading capacity throughout, per cent	77.7	76.9
Costs		
Gasoline	$268.99	$293.43
Oil	15.66	40.76
Drivers	357.20	357.20
Administration	81.66	81.66
Depreciation	252.53	439.37
Maintenance, material	63.48	171.53
Maintenance, labor	49.38	93.13
Consumer's tire cost	830.96	394.19
Miscellaneous	7.50	17.00
Interest	64.94	59.56
Insurance	7.30	7.30
Rent	25.00	25.00
Total operating cost	$2,024.60	$1,980.13
Efficiency[5]		
Cost per mile	$0.2868	$0.3024
Cost per ton-mile	0.1055	0.1123
Gasoline, miles per gallon	5.9	5.1
Oil, miles per gallon	332.0	140.7
Time per round trip, hours	4.3	5.6
Truck speed, m. p. h.	18.6	14.3
Time saved, hours	115.7	......
Driver's earnings—		
Straight time 57.8 hours, at $0.60	$34.68	......
Overtime 57.8 hours, at $0.90	$52.02	......
Saving on ton-mile cost	$130.48	......
Net saving effected	$217.18	......
Net gain by cost reduction, per cent	10.7	......

[5] Credit not allowed pneumatic-tired equipment for additional available hours over solid tires; increased satisfaction and better personnel of drivers, with less labor turn over, value to production in effecting quicker deliveries, additional safety and fewer claims for breakage in pay loads.

POINTS FROM THE DISCUSSION OF PNEUMATIC VS. SOLID TRUCK TIRES

J. E. SCHIPPER:—On the large-size tires there is considerable more of a flat tread than on the smaller sizes; that is, the sidewall seems to be built up. Would that work out to advantage in the smaller-size tires, and has it any effect on the gas consumption on rutty roads?

CHAIRMAN HALE:—There is a flat tread and steep sidewall on the 44 by 10 and 48 by 12-inch tires. In 1917 it was decided that we should make a 44 by 10-inch pneumatic truck tire with sufficient carrying capacity to support a 3-ton truck. The greatest difficulty encountered was to prevent separation between the tread and the carcass. The first tires were made with round treads, which caused the tires to flex considerably before the necessary contact area could be obtained. This flexing, combined with a component of the vertical load on the tire, resulted in a tremendous shearing action between the tread and carcass, which in time caused the tread to separate from the carcass or tire body. The logical thing was to make the tread flat, to give the necessary contact area without so much flexing and to widen it out, which would decrease the unit stress on the union between the tread and carcass of the tire. We did that and the results have been very satisfactory.

There seems to have been an understanding among tire designers that it is not good practice to have much of a shoulder at the edge of the tread of passenger-car tires. However, we have proved that a flat tread of the proper proportions has several distinct advantages and results in much longer tire life. As to the relative economy in gasoline consumption of the two types of tire on rutty roads, there would be a slight advantage in favor of the round tread; but when good roads are taken into consideration the advantage would be in favor of the flat tread.

Have any tests been made to determine what the trucks geared to run 30 m.p.h. with a large engine will do in city travel? Is this truck limited to one particular use?

Gasoline and oil consumption comparisons hardly seem fair. The pneumatic records have been made on trucks with tires which have been developed for this purpose. The commercial solid tire has been made to sell. The efficiency varies tremendously. That may possibly be due to variations in tire manufacture. The tires used on electric trucks have to be made of an entirely different compound. So far as we have been able to determine, the highly efficient solid tire does not give any reduced mileage. Under equal conditions it gives better mileage. There is also a possibility for the development of the solid tire. We have run a few S.K.[6] tires and have had remarkable results. That tire has great possibilities for city work.

In connection with pneumatic tires, the demand comes from people who want to put these tires out in the country where there are no good roads. They buy them because they cannot get there with the solid tires. But they soon find that operating trucks under those conditions is hard on the truck tires, engine and every other part of the chassis and body. That immediately brings about a demand for a good road, with a foundation and with good surface. With the ultimate road of that type, what sort of tire will be used? The trend toward the pneumatic tire may change in time because of the changed condition of the road surface. The locomotive with its steel track and steel wheels gets satisfactory running under most conditions. It will be a long time before we have the type of road which the railroad now has, but the smooth hard road appears to be the ultimate road. If that is the case, would not the solid tire serve well?

MR. SCOTT:—Regarding the 30-m.p.h. truck designed for pneumatic tires, its efficiency and the speed at which it must run in city streets, this is a question of the efficiency of the large engine in comparison with the small. Practically all of our experimental work has been over long runs. By using a 5-ton truck engine to draw a 3-ton load we found that this engine was more economical than that of the 3½-ton truck. This is because of the ease with which the large engine does the work. Over the mountains the smaller engine was working at a maximum. A very close check on that showed a 0.7-mile difference in gasoline consumption of the larger engine over the smaller.

City work is dependent upon the stops to be made. Many trucks stop often; with these we can get about two miles per gallon of gasoline. With that same truck outside of the city, we can get six miles per gallon. An average on all the buses shows about five miles per gallon of gasoline with a 2-ton chassis. But that is not low mileage, because of the unusual number of starts and stops.

[6] Goodyear cushion tire.

Chairman Hale:—The efficiency of solid tires as far as absorbency is concerned depends entirely upon the formula used in compounding the rubber. It is possible to have a wide range in the efficiency of the rubber stock. There seems to be a very positive indication of a very satisfactory saving of gasoline in the use of the pneumatic as compared with solid tires.

Mr. Foljambe:—In regard to the tendency toward or away from pneumatic tires when we get good roads, it seems that the tendency toward pneumatic tires will be increased under those conditions. With good roads, speeding is the next thing desired. Even on good roads the desired speed cannot be attained with a solid tire. There never will be a time when all roads will be improved. Even with a highly-improved highway system the truck must occasionally leave the hard surface, which again requires some kind of tire other than a solid one.

Chairman Hale:—The speed at which the pneumatic-tired trucks shall be operated must be controlled entirely by the safety at which they can be operated. We have found that 25 to 30 m.p.h. is satisfactory; it is very similar to passenger-car speed.

There has been considerable talk to the effect that the pneumatic-tire equipment for trucks would completely supersede solid-tire equipment, with the claim that the pneumatic tire rides so much easier that the truck chassis will stand up better than it would in the case of the solid tires. No doubt this is true in the country when driving at high speeds, but it has been my experience that heavy trucks in crowded city traffic on short hauls last practically indefinitely when run on solid tires, because the nature of the service and the traffic conditions prevent the truck from running fast enough to develop any serious vibration. I feel that there will always be a large field for solid tires for heavy trucks in city work.

H. B. Knap:—On trucks in general it appears that solid tires will be used in cities for short-haul hard-road low-speed work. Pneumatic tires will be used for high-speed long-haul conditions and for soft-road rough-country conditions. In other words, the added expense per mile of the pneumatic tire must be offset chiefly by making more trips per year, either by virtue of higher permissible speeds or by being able to negotiate soft roads and ground where solid-tire equipment cannot operate.

Mr. Darrow:—The question of solid and pneumatic tires can be argued only on two counts. The first is reliability. We can expect 7,000 miles and over from pneumatic tires. During the life of each tire we can expect to remove it once from necessity, and perhaps other times for treatment. With average mileage and care we must remove one tire per month.

The second point is cost. The first-class improved highway of concrete, with a deep foundation, costs $40,000 per mile. Mr. Seiberling mentioned that there are 200,000 miles of more-or-less improved highways in the United States. This runs up to $8,000,000,000. If we ever get highways of that character, the element of depreciation on roads must be included in the cost of pneumatic tires.

In regard to unit load, there is a limit to the weight that can be carried on solid tires per inch of tire width. As a matter of fact, this is not the right way to measure it; it should be pounds per square inch of contact area. With pneumatic tires, the load per each square inch of contact area is equal to the inflation pressure. As to the cushioning, a solid tire deflects about ⅜-inch. A pneumatic tire deflects ¾-inch or more. We have only one-quarter the impact with one-half the load, per square inch. Those things have a bearing on the maintenance of the foundation of the road. The road is the expensive part. We must keep in mind that solid tires will injure the foundation of the road and that the investment involved in keeping the roads in repair is tremendous.

To sum up and connect three things together, in a pneumatic-tired truck we have a saving in the truck itself, an increased efficiency and a large saving in roads. Taking into consideration only the initial tire cost and mileage delivered, we cannot show that pneumatic tires are more economical but, considering these other things, there is no question that pneumatic tires excel solid ones.

Joseph Schaeffer:—Considering the future prospects of large-size pneumatic tires, it appears that the weight will prove the main limiting factor. A driver and his helper can handle a tire with rim below 200 pounds, so that the 40 by 8-inch tire would still be practical, while the 48 by 12-inch tire, weighing with rim about 500 pounds, can hardly be handled by one or two men without involving undue effort. In exceptional cases the very large sizes may be justified and establish a field of usefulness, but for general adoption they appear to be too heavy and too expensive

THE NEW YORK ELECTRICAL SHOW

The annual New York Electrical Show was held October 6-16, inclusive, at Grand Central Palace. The displays made by an unusually large list of exhibitors were of much popular interest since many of them featured household electric appliances of every sort, in which rubber in some form is used. No housekeeper, it would seem, can afford to do without some of the labor-saving electrical machines, such as those for washing, ironing, cooking, and cleaning. A few only of the typical exhibits need be referred to here.

The Habirshaw Electric Cable Co., Inc., exhibited detailed plans showing how a home should be wired and where outlets should be placed. The exhibit also included samples of all the types of wires, cables and cords essential for the full utilization of the many domestic appliances which relieve household work of drudgery.

Western Electric Co. showed a complete assortment of electrical appliances for the home. Five essential machines of more than ordinary importance were shown, namely, the clothes washer, vacuum sweeper, dish washer, portable sewing machine, and ironer.

The Westinghouse Electric & Manufacturing Co. A general display of electric household heating devices for laundry, kitchen and nursery was augmented by an exhibit of a number of motor-driven appliances using small Westinghouse motors. This includes machines for washing, ironing, vacuum cleaning and dish washing. In another section the same company showed a complete motion picture equipment using a Westinghouse motor-generator set to transform from alternating to direct current, a studio light-control outfit for motion picture work and an outfit for charging vehicle batteries.

The Elasticap Co. demonstrated the value and convenience of Elasticaps, molded rubber caps, for the positive insulation of end splices of electric wires. They do away with the usual and often unreliable rubber tape method, meet all requirements of the fire underwriters, and are approved by the Underwriters' Laboratories, Inc. The Elasticap was illustrated and described in The India Rubber World, March 1, 1920, page 366.

The General Electric Co. in its main exhibit showed in actual operation many of the latest devices and apparatus for the utilization of the heat of electric energy. Of special interest were the following: electric arc welding equipment, automatically making perfect welds without attendance; electric furnace, heat-treating steel parts and tempering in an electrically heated oil oven for japanning and baking foundry cores; besides various other industrial heat applications, electric vehicle charging, and better lighting equipment of industrial establishments emphasized by an exhibit of four miniature models of machine shops. The results of research work in the insulating material field made an unusual display.

Safety and Sanitation for Rubber Mills and Calenders[1]

By C. B. Mitchella[2]

SAFETY AND SANITATION for rubber mills and calenders covers so many opportunities that if discussed fully it would fill a large volume. Many schemes have been tried with varying success for accomplishing the same purpose, and it is the intention that this paper shall present only the most important precautions and the most successful installations.

EDUCATION OF OPERATOR

Although the education of the operator is the most important of all precautions in preventing injuries on mills and calenders, this part of the subject will not be presented in detail; instead, the discussion will be confined to mechanical safeguards. However, a few pointed suggestions, or rules, to develop mental alertness of the operators are submitted as follows:

GENERAL RULES

1. Follow instructions of your foreman and your inspectors only.
2. Wear no clothing which can be caught in the machines, such as long sleeves, loose neckties, aprons or unbuttoned jackets.
3. Keep your eye on the job all the time, and give your work your entire attention.
4. Keep your hands off moving rolls.
5. Never force the rubber into the bite of the rolls with your hands.
6. Never oil, clean or repair your machine while it is in motion.
7. When cutting stock off roll, always cut below the center.
8. If you feel ill, or in such condition as to interfere with your work, report at once to your foreman.
9. Stop machine at once in case of emergency. Do not wait for instructions.

RULES FOR MILLS

1. Never allow your hand to go past the top of the roll, and never reach over one roll to work on the other.
2. Watch your hands when the rubber folds over. Don't let them get caught in the folds. Be careful in doubling the ends of batches when "batching out."
3. Never cross arms when cutting or rolling stock from the mill. Learn to cut and roll with both hands. When cutting from left to right, cut with right hand and roll with left. When cutting from right to left, cut with left hand and roll with right.
4. Never take anything out of the rolls while the mill is in motion. Stop the machinery.
5. Never stand on the mill pan, compound boxes, platforms or makeshifts.
6. Never work with one hand under the rolls while the other is above them.
7. Take care not to catch your fingers between the guide and roll.
8. The back roll of the mill runs faster than the front. Be careful.

RULES FOR CALENDERS

1. Never pick stock out of the bite of the rolls.
2. In starting end of liner in building up plies, keep your hands at least six inches from the rolls.
3. Never start calender unless properly signaled.

SAFETY IN OPERATION OF MILLS

SAFEGUARDS ON MILL PARTS

A safety throw-out to stop the mill in case of accident consists of a horizontal throw-out bar heavy enough to resist the struggling of an injured operator, placed over each mill roll. These bars should be located six feet above the floor upon which the operator stands, and in plan be located 18 to 21 inches to the front and rear of the bite of the rolls. Fig. 1 illustrates this double type of throw-out. The cross bars are made of one-inch steel rods rigidly attached to the double levers.

There are three predominating methods of cutting off the power from the mills: (1) magnetic clutch brake mounted on motor shaft; (2) mechanical clutch on either the drive gear of the mill, or on the motor shaft; (3) dynamic braking of the motor. From the experience the writer has had on all the above types, recommendation is made to use either the magnetic clutch brake, or the dynamic brake, preferably the former, and the discussion is confined to those types of apparatus. If the magnetic clutch brake is used, it is best to place over one housing of each mill an electric cut-out switch. Many installations of mill lines have been made with only one switch for the whole line, the switch being operated by a cable running from one end of the line to the other, or operated by an equivalent rod. This method is not perfectly reliable because of the lost motion due to the variable tension in the cable, or the torsional deflection and binding of the rod, any of which will slow down responsiveness of the switch. In order that the cut-out switch may be opened with the least travel of the safety throw-out bar, the switch spindle should be geared up to the throw-out lever shaft in a ratio of about five to one. Consequently, it is not necessary to move the safety bar a distance of more than three and one-half inches either up or down. The travel of the safety bar and lever is limited by an adjustable stop, which prevents damage to the electric switch by being thrown too far, and which makes the safety bar more rigid to resist the struggling of an injured operator. It should not require more than a five-pound force on the safety bar to throw the switch.

The electric switch should be entirely enclosed so that dirt cannot gather on contacts. The wiring from the mill switches should be carried in conduits down the housing, and through the mill pits to the panel board and magnetic clutch as shown in Fig. 2. The brake on the magnetic clutch should be operated by a counterweight and be capable of bringing the mills to a complete stop in no greater time than one second. While the mills are running, this counterweight is held inoperative by a solenoid electrified by a circuit which connects the mill safety switches and the clutch. This circuit is fed through circuit breakers which are held closed by a solenoid operated latch. After the clutch circuit is broken these circuit breakers cannot be closed except by the operator's going to the panel board and resetting by hand. Therefore the clutch cannot be engaged if the operator should first close the safety switch. It is probably useless to describe the well-known construction of the magnetic clutch, but it may be mentioned briefly that this clutch is of the disk type, the two disks being drawn together by electromagnets.

Dynamic braking is accomplished by cutting off the current which feeds the motor and at the same time placing a low resistance short circuit across the brushes of the motor armature. The motor then acts as a generator requiring considerable driving power. Obviously this power comes from the rotating parts of the mills, decreasing their momentum. As the speed decreases, the power generated by the motor decreases and brings the motor and mills to a smooth yet rapid stop.

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[1]Paper read before the Rubber Division of the National Safety Council at Milwaukee, Wisconsin, September 30, 1920.
[2]Engineering Department, The B. F. Goodrich Co., Akron, Ohio.

There are numerous types of mechanical clutches which have been applied to mill drives, most of them without brake. Among these, the spiral coil clutch and a disk clutch operated by compressed air are used probably more than other types. No doubt a mechanical clutch can be designed for quickly cutting off the power, but a great many of these clutches now in use do not release readily. In no event should a mechanical clutch be installed without a powerful brake in connection therewith.

The foregoing methods have been applied principally to groups of mills driven by one motor, but the method is equally applicable to an individual mill with its motor drive. An individual clutch for each mill on a line of mills is not so advisable as one clutch controlling a number of mills, because the greater the number of mills, the greater is the resistance and the quicker is the stop.

It is possible that the best throw-out mechanism that might be devised may not operate when most needed, and therefore it is very necessary that daily inspection and tests be made to determine the condition of these safety devices, and a record kept of the surface travel of the rolls. No day should begin without this test, and no mill should be operated until its safety throw-out is in perfect operating condition. Frequent tests with the mills loaded should be made to ascertain the surface travel of the rolls.

The location of the mill pan has much to do with the safety of the operator, particularly as to the distance which the operator is kept from the face of the rolls. One of the principal precautions for safety in mill operations is to prevent the operator from placing his hands beyond the top of the nearest roll. It has been found excellent practice to have the least distance from the bite of the rolls to the edge of the pan 3 feet 8 inches on 84-inch mills, and 3 feet 1 inch on 60-inch mills. If, for any reason, it is not practical to locate the edge of the pan so far from the rolls, then a bar or pipe guard should be placed at the equivalent location. The front and rear edges of the pan should be smooth, preferably turned down or beaded, to prevent injury to the workmen's legs.

The height of the top of the mill rolls above the floor upon which the operator stands should not be less than 4 feet 2 inches. A height less than this gives the operator too great an opportunity to place his hands too far into the mill. This height may be increased to as much as 4 feet 6 inches without making it difficult to feed stock into the mill.

The speed of the mill rolls should not exceed twenty-five revolutions per minute. Higher speeds cause difficulty and danger in cutting and rolling of stock.

The roll-adjusting screw which projects through the front of the housing should have threads of large lead, so that the mill rolls may be separated in the shortest possible time, thereby releasing an operator caught between the rolls before he can be burned seriously. With threads of large lead, the adjusting screw will tend to back off, because of vibration, but this can be overcome by placing a quick operating clamp back of the head of the screw.

Between the roll-adjusting screw and front-roll bearing is usually placed a safety breaking cup. This cup often breaks into many small pieces which frequently strike the operator. A band or screen ought to be placed around the cup to confine these pieces.

Gears ought to be guarded most thoroughly if it is probable that a workman may be compelled to be adjacent to them. It is advisable in any case to enclose the outside perimeter or face of gears with a sheet steel band to prevent oil or grease from depositing on the floor of the pit. For most thorough guarding, a solid enclosure of steel plate should be provided over faces of gears and down the sides beyond the depth of the teeth, and the point of contact between gears covered completely. Projecting keys, and other projecting revolving parts, as well as spokes, ought to be covered with removable wire mesh, which will not prevent visual inspection of the gear parts. Proper door openings must be provided in various parts of the guards, to facilitate inspection of the gears, and the guard designed so that it may be quickly removed when necessary to repair the mill. Guards should be attached neatly and rigidly to a machine to prevent rattling or sagging, or being knocked out of shape, for otherwise the guard may suddenly be removed by a self-appointed specialist, because of its being an aggravation and eyesore.

If there is no passageway between the ends of mills set in a group, then there is no necessity to guard the gears so thoroughly. Instead, a pipe railing, at least 3 feet 6 inches high may be placed between the mills and be fastened to the mill housings. Pipe railing, with gate, should be set around motor

FIG. 1. DOUBLE THROWOUT TYPE OF SAFETY STOP DEVICE FOR MILLS

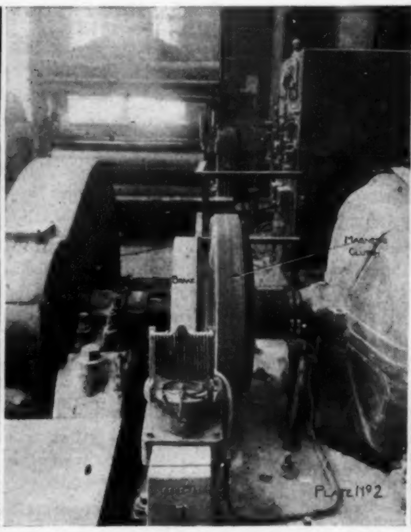

FIG. 2. ELECTRICAL WIRING FROM MILL SWITCHES SHOULD BE CARRIED IN CONDUITS

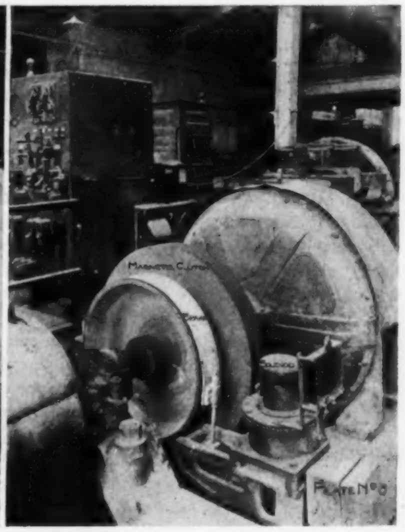

FIG. 3. THE BRAKE ON THE MAGNETIC CLUTCH SHOULD BE OPERATED BY A COUNTERWEIGHT

panel boards and other electrical equipment, and these railings wrapped with friction tape, particularly where workmen operate the electric switch and may be in contact with railing. Pipe railings around pits, such as for motor drives, are often covered with steel plate from floor to top of railing so that materials may be stored adjacently without falling into the pit.

Fig. 4. Each Mill is Provided with a Sheet Iron Hood

A mixing apron is desirable for continuously feeding rubber and pigments into the rolls. This apron reduces the number of manual operations which would otherwise be necessary to feed the mill entirely by hand, and therefore it proportionately reduces the possibilities of injury to the operator. The apron should not be closer than five inches above the mill pan.

MISCELLANEOUS SAFEGUARDS AROUND MILLS

Many injuries have resulted by workmen falling on slippery mill room floors, and various floor coverings such as rubber mats and non-slip metal have been provided for the operator to stand upon. These are not entirely satisfactory except that light weight non-slip metal can be used to good advantage for cross overs between mills to cover the pit and line shaft, and where it is necessary to remove floor for repairs to equipment. A non-slip cement floor can be made perfectly satisfactory and maintain a perfectly smooth surface. Several prominent firms have laid such floors for years by constructing the original floor finish with a carborundum treatment as follows:

Proceed as in a neat cement floor finish to the point where the area has first been wood floated to a level surface and finished smooth with steel floats, then sprinkle the finished area with a dry mixture composed of one part of 12-30 carborundum grit and two parts of Portland cement. Wood float to a smooth surfact and finish with steel float. Sprinkle the area a second time, wood float to a smooth surface and again finish with a steel float. In the two sprinklings use one and one-third pounds of carborundum grit to each square yard of surface. Cover and keep wet seven days, or longer, the same as for neat cement finish.

The above method will make a floor surface which is considerably harder than the ordinary cement finish. This method can also be used in combination with the metallic floor hardeners.

Several accidents have been attributed to improper lighting of mill rooms. Momentary blindness of workman caused by excessive glare of lamps may be the cause of a workman making a wrong movement. A poor lighting system will produce fatigue due to continuous eye strain. A general lighting system of uniformly spaced units distributing light equally over the whole mill room, with an intensity of 5 foot-candles, as shown in Fig. 1, will make the mill room a safe and cheerful place to work. An inexpensive lighting unit may be used, the reflector being of metal, dome type, porcelain enameled. This reflector used with a bowl enameled type C lamp of high wattage, will produce a diffused, high intensity, non-glaring illumination. However, where ventilating hoods are placed above the mills it will be

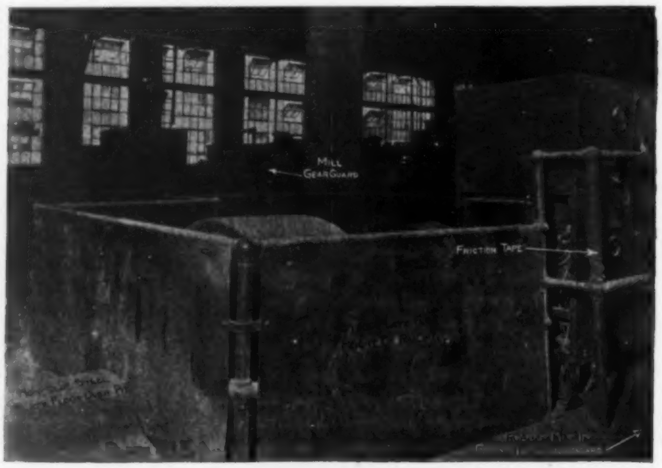

Fig. 5. Mill Pits and Switchboards Should be Safeguarded

necessary to install a local lamp under the hood in such a location that it will be up and out of the normal vision. This lamp should be covered with a heavy cage to protect it from breakage. The intensity of light on the mill rolls should be the same as provided in the general lighting system. This is important, for if the light on mill rolls were different from that outside the hood, eye strain would be produced, with resulting discomforts and hazards.

SAFEGUARDING HEALTH IN MILL ROOM

Ventilation and cleanliness are equally important with mechanical safeguards. It is possible that a workman can operate for a lifetime a machine having not a single safeguard, but not so, if he is compelled to work in a poorly ventilated, dirty room, for he may eventually become as much if not more of a physical wreck as though he had been injured on his machine. Bad ventilation and dry, dusty atmosphere dull the workman, and slow down his productiveness. In mill rooms the installation of a ventilating system is absolutely necessary. Oftentimes natural ventilation may accomplish fairly good results, especially in a small mill room having a high ceiling. However, it is impossible to handle a few pigments, such as lampblack, zincs and leads, as well as soapstone, satisfactorily, without mechanical ventilation. The ideal ventilating system is one which will heat, ventilate, clean and humidify the air. Local conditions and first cost often prevent a near approach to this ideal. Because the maintenance of air washers handling rubber pigments has been difficult, many systems have been installed without the washers, with success. A brief description of such a system is as follows:

Heat, dust, and fumes arising over the mills are carried away by an exhaust system. Each mill is provided with a sheet iron hood covering the mill. The under side of this hood should not be less than 6 feet 6 inches above the floor upon which the workman stands. Fig. 4 illustrates this hood and the air ducts. The two sides of the hood over the housings are enclosed with sheet iron, but the front and rear are open. However, conditions often demand that canvas curtains on spring rollers be mounted upon the front or rear of the hood to prevent the operator actually throwing compounds across the rolls and out on other side of the mill. Fig. 4-A illustrates a cross-section of the

preferred type of mill hood. The preferred type is the ordinary box style of hood with the air duct connected to the middle of the top through a flared connection. This style of hood insures that the air currents carrying dust and heat from workmen will go directly to the middle of the top of the hood, where the duct connection is made. An alternate type of hood is also illustrated in Fig. 4-A. This type of hood has a so-called false ceiling which makes a small space through which the air passes near the outside edges of the hood. This small space creates a higher velocity near the edges of the hood. There is also an opening in the top of this ceiling directly into the air duct. This alternate type does not carry all the dust-laden air directly from operator to the middle of the hood. It has the objection of carrying a great portion of the dust to the front or rear edge, where there is a possibility of its rolling out from underneath the hoods, and it is necessary in order to overcome this last objection to maintain a very high velocity of air which will actually carry away all of the dust.

In the preferred type a slower air velocity may be maintained, and it is found that near the center of the hood a considerable amount of the dust actually drops back onto the rolls and is mixed in with the rubber. This is one of the best features of this type of hood, for it does away with the necessity of an air washer, and the small amount of dust which is carried away through the ducts is easily collected. The hood should be connected to the air ducts by a flexible connection so that the vibration created on the mill will not be carried to the ducts and cause leaky joints. The ducts are carried to a centrifugal multivane exhaust fan which discharges into, preferably, a vertical flue carried to the top of the building. In the case of a one-story building it is preferable to carry this exhaust flue at least forty feet above the ground level. At the base of this flue is a collecting chamber located below the entrance of the fan duct, into which nearly all the dust descends by gravity and may be removed through a cleaning door. For an 84-inch mill the volume of air for the preferred type of hood is 3,800 cubic feet per minute, at a velocity of 1,300 feet per minute. The static pressure necessary to be maintained in the ducts varies according to the design of the ducts and the length of runs. Such pressure will rarely exceed one and one-half inches of water.

In order to offset the large volume of air removed from the mill room through the hoods, it is necessary to feed in fresh air. In summer time this is easily accomplished by opening the windows, but in winter it is necessary to force heated air into

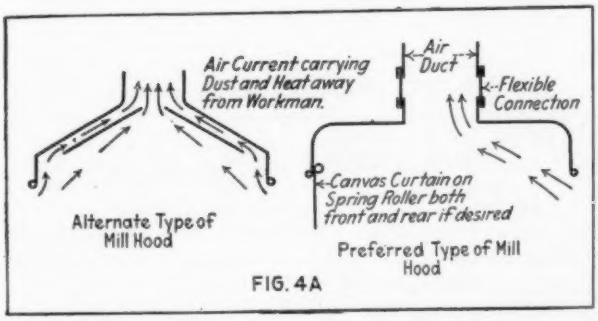

FIG. 4-A. THE PREFERRED AND THE ALTERNATE TYPE OF HOOD

the room by fans. This air ought to be heated to about 90 degrees F. and distributed equally over the entire room. It is also possible, in order to save expense of heating the entire volume of air, to recirculate a portion fed into the flue by exhaust fans, and also to draw air from other portions of the building, preferably from stair and elevator towers.

With the best type of ventilating system, as described, there is still an opportunity for dust to collect in various parts of the mill room. Perhaps the most frequent cause is from dusting batches of stock with bags of soapstone. This dust will accumulate on the floor and stock racks. To keep these parts of the building and floor in the cleanest condition a vacuum cleaner is advisable. With this system of cleaning there is no dust stirred up, as is the case with brooms or brushes, and the cleaning is more easily facilitated. With the vacuum cleaner system one man under ordinary circumstances, ought to clean 3,500 square feet of floor per hour. This system is also very desirable to clean walls, ceilings, pipes, machinery and equipment, and motors. Another aid to cleanliness is the running of curbs around all pits, so that rubbish, etc., may not be kicked into them.

SAFETY IN OPERATION OF CALENDERS
SAFEGUARDS ON CALENDER PARTS

The various methods of quickly stopping mills, previously described, are equally adaptable to calenders. The dynamic braking of the motor is perhaps most simply applied and operated and requires no extra floor space. A throw-out bar is necessary in both front and rear of the calender, and this bar should be a steel rod or pipe and be placed full width between the calender housings.

Signal bells, or their equal, should give warning each time the calender is to start or stop; one bell to be so connected that any workman may signal when he desires the calender started or stopped, and another bell directly connected with the motor controller or other starting and stopping device. The latter bell will automatically give warning to all workmen. If calenders are operated in trains, the safety appliances should be so arranged that operation of any one of the safety switches on the various calenders will instantly stop the entire train. The operation of a train of calenders should be as a unit, and under the control of one operator, the only person who can start the machines.

All switches and control boards should be of the enclosed type, making it impossible for the operator to be in contact with live parts. Control panels are best situated in a separate room open only to authorized electricians. Rubber floor mats are necessary in front and rear of all control boards.

Feeding stock into calenders has caused more accidents on these machines than any other operation. Nearly all of them resulted from feeding fabric or sheet rubber into the calender rolls, and into the wind-up. Statistics show that comparatively few accidents have occurred from feeding batched gum, and there is no good reason why any should occur. A sheet metal table about twelve inches wide and the same length as the rolls, located about six inches below the bite of the rolls, will hold the gum while feeding. If it is necessary to feed small pieces of gum this may be done with the aid of a wooden paddle or pusher.

Feeding fabric or sheet gum is not so easily accomplished, and it is necessary for the operator to place his hands close to the rolls, unless it is possible to use a guard which will also assist in starting the fabric into the rolls. Although numerous efforts have been made, it seems that no really efficient guards of this type have been devised, and experimental ones have generally met antagonism from the workmen as being a hindrance to rapid and successful work. Such a safeguard is most needed to feed sheet stock between closed rolls, but the space available is not sufficient to provide safety without impeding production by making it impossible for workmen to place the sheet within a reasonable distance from the rolls.

If a calender does not require the two bottom rolls to be in contact with each other, and if the bottom roll is used only as an idler roll to return the stock to other side of calender, then the bottom roll should be lowered about three inches so that

a man's arm can pass between the rolls and not be pinched. Where the rolls cannot be thus separated, it may be possible to separate them to such an extent that a guard can be used successfully. A guard used in several factories consists of two horizontal steel plates about 1½ inches apart, extending in between the rolls. (See Fig. 7.) The lower plate does not extend so far

FIG. 6. NON-SLIP FLOORS ARE NECESSARY AROUND CALENDERS

inwardly as the upper plate, and this allows workman to place the stock on the lower roll; and if the travel of the roll should carry his fingers forward they will strike the upper plate without harm. To be successful, this guard must be constructed very heavily, and be very rigidly attached to the machine. A scraper bar is attached to the lower section of the guard after the guard is in place, and so adjusted to the roll that there is only a very small clearance between the scraper and the roll. This scraper is for any stock which may get around the lower roll and which would have a tendency to roll up under the guard and bend it out of shape. It must be urged most forcefully that a man who is working on a calender with separated rolls shall never be transferred to another calender having its rolls in contact, for the knowledge of not being subjected to danger on the first type, forms a habit of placing the hands between the rolls, and this habit will unconsciously be continued on the latter type and result in severe injury.

All wind-ups and let-offs should have a stationary hand-wheel for adjusting the tension in stock. This can be accomplished by mounting the hand-wheel on the wind-up bearing, the outside of the bearing having screw threads upon which the hand-wheel adjusts itself against the friction disk. To hold the stock shell bar within the wind-up spindle, a smooth ring should slide on the spindle and cover the end of the bar. This ring can be locked in position by a pin with a spring. No projecting set-screws or pins should be placed on any revolving part of the wind-up.

All idler rolls ought to be placed as far as possible from calender rolls. Particularly is this true where the stock passes between the idler and the calender rolls, for serious accidents have occurred where the operator was caught by the stock and drawn between the rolls.

Gear guards and pipe railings as described under the subject of mills, are equally adaptable on calenders. Fig. 6 illustrates excellent guards.

Non-slip floors are particularly necessary around calenders. A concrete floor with carborundum treatment, previously described, will not become slippery from soapstone because the grains of carborundum cut the soapstone and prevent it from adhering to the floor finish. Between the housings of the calender it is usually not practical to lay a concrete floor, and therefore a metal floor predominates. This metal floor surface ought to be rough. Objections are often heard against this, and it is contended that a rough floor may damage the tail end of the stock which drags along the floor before being wound up. However, this objection is greatly overdrawn. Fig. 6 shows such a floor under a calender which has been doing a high grade of work for years.

Illumination for calender work is important, not only to safeguard the workman, but particularly to produce work of highest quality. Too many calenders are being operated with local lights attached to the machine. The general lighting system described for mill rooms is recommended for calender rooms, except that the maximum amount of light should be given the calenders, and a lower intensity in the aisles. The intensity on the calenders ought to be 10 foot-candles uniform lighting, and about 5 to 6 foot-candles uniformly in the aisles. If glare is eliminated this difference in intensity will not produce eye strain.

The tendency in calender work has been toward increased width of stock and greater lengths, which has produced rolls of stock of great weight and unwieldy size, and consequently greater chance of injury to operator. Careful consideration of methods of handling heavy rolls of stock becomes very important. An electric or air hoist mounted on a trolley is perhaps the simplest and quickest means of lifting these rolls.

A calender may produce excessive heat or fumes, making it advisable to install a ventilating hood above, and connected to an exhaust fan. However, it is far better to have a high calender room, preferably one story, with saw-tooth skylights to give good ventilation and light. If the room has a low ceiling then mechanical ventilation is necessary, especially during summer months and times of high humidity.

Where excessive soapstone or stock dusting accumulates on the floor under the calender wind-up and let-off, a suction system should be provided. This dust should fall onto and through a latticed or perforated floor into a chamber from which it is drawn into a duct and thence to a fan exhausting into a stack as described for mill room ventilation.

The vacuum cleaner principle has been applied to the cleaning of liners and this obviates most of the flying dust around calen-

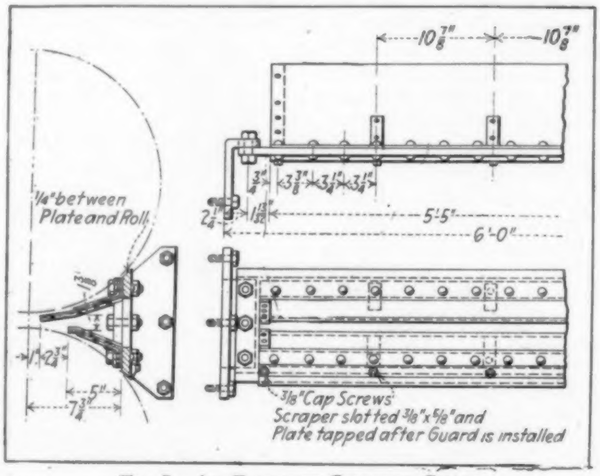

FIG. 7. AN EFFICIENT CALENDER GUARD

der let-offs and wind-ups. A vacuum cleaner is of even more importance in a calender room than in a mill room, for in addition to the benefit to workmen, there is an extreme necessity for cleanliness of calendered stock. All pits and openings in the floors should be free from rubbish and grease, and should have proper curbs around them.

CONCLUSION

The foregoing descriptions have covered mechanical safeguards which for a large part depend upon a little common sense on the part of workmen in providing personal care. Workmen

should be educated to know thoroughly the dangers which a safeguard covers, that they may furnish the precautions which the safeguard cannot. It may be possible to safeguard a machine so thoroughly that it would be impossible for a workman to injure himself deliberately, but with the result that the workman would eventually dismiss from his mind any thought of danger. It would be folly to place such a man on another machine which cannot be so well guarded. Thorough education in safety is, after all, the most important requirement, and it not only provides protection in his mechanical duties, but it expands his mental capacity and alertness to provide protection for himself and his fellow-men at all times, everywhere.

The Effect of Certain Accelerators Upon the Properties of Vulcanized Rubber—II[1]

By G. D. Kratz and A. H. Flower[2]

In a recent paper,[3] H. P. Stevens has given new figures, and from them made a number of deductions in regard to certain discrepancies between results obtained by the present authors[4] and earlier results obtained by him.[5] We do not entirely agree that these latest deductions will suffice for the complete coordination of his former results with ours. This view is confirmed by the repetition and amplification of our former experiments, including work with extra light instead of heavy calcined magnesia.

This work was carried out with a sample of the rubber previously employed and also with another rubber of similar physical appearance. Entirely different results were obtained with the two rubbers. In neither instance, however, was extra light magnesia found to develop greater activity than Accelerator A, and, in one case, it was markedly inferior to the latter. In both cases where Accelerator A was employed, the load required to effect a given extension led to erroneous conclusions, if used as a criterion of the rate of cure.

As these results were obtained with accelerators of definite composition and purity, the differences may be attributed to variations existing in the rubbers themselves, and most probably in the nature, amount, or condition of the extraneous materials present. As a considerable portion of this extraneous matter was extractable with acetone, an investigation was made of the relative effect of the two accelerators upon the two rubbers after extraction. Since the nature of the substances removed by the extraction[6] was not studied, no attempt can be made to correlate the effect of the extra light magnesia with any definite one of the extraneous substances originally present in the rubber. Certain facts, however, have been well enough established to deserve brief consideration.

It was noted by Spence[7] that the nitrogen in rubber was not entirely of protein origin, and that nitrogenous bodies of well-defined alkaloidal character could be detected in the acetone extract of Pará rubber. This was subsequently confirmed by Spence and Kratz[8] for plantation crêpe (*Hevea*), although a difference in the character of the protein material in the two rubbers was found. Further, certain of their results indicated that in plantatation *Hevea* the non-protein nitrogenous substance was not easily extractable with acetone. Dekkar[9] also noted the presence of nitrogen in the acetone extract, and gave figures for nitrogen distribution in the extracted rubber and its acetone extract which closely confirmed those originally obtained by Spence. Prior to Dekkar's observations, Beadle and Stevens[10] noted that the rate of vulcanization of certain rubbers decreased if the rubbers were previously extracted with acetone. After vulcanization the physical properties of the acetone-extracted samples were so greatly impaired, due either to the loss of the resin or the physical effect of the solvent upon the rubber, that the decrease in the rate of cure was considered of secondary importance.

It would therefore appear that the removal of the acetone-soluble nitrogenous constituent is responsible for the decrease in the rate of cure of the rubbers, rather than either of the causes originally assigned by Beadle and Stevens.[11] This is also in accordance with the later results of Eaton, Grantham and Day,[12] and of Stevens,[13] wherein the accelerating substance of plantation *Hevea* rubber was found to be an organic base or mixture of bases, probably formed by the degradation of the protein portion of the nitrogenous material originally present in the rubber.[14]

The possibility that magnesia may hasten this degradation, with the formation of an accelerator similar to that produced by the biological decomposition of the proteins, has already been pointed out by Eaton[15] in commenting upon the patent of Esch.[16]

In view of the well-known action of many synthetic organic accelerators in the presence of certain mineral oxides, such as that obtained by Cranor[17] with zinc oxide, we are led to the conclusion that the effect of small amounts of magnesia in accelerating the vulcanization of rubber is of a secondary or contributory, rather than a primary nature, and consists largely in effecting a response from the natural accelerator in the rubber. This finds further confirmation in the observation of Stevens in his previous paper, wherein he pointed out that the accelerating effect of extra-light magnesia decreases when a sulphur coefficient of 2.0 to 2.5 has been attained. At this point, increased amounts of magnesia would have no effect, as they would be in excess of the amount required by the natural accelerator, which is present in the same definite and limited amount in all of the mixtures.[18]

The same would not be true for Accelerator A, which is regarded as a primary accelerator and is present in the various mixtures in increasing amounts up to 1 per cent of the rubber.

In conclusion, we wish to draw a distinction between the terms "effect of accelerators" and "action of accelerators." This paper deals primarily with the effect produced by certain accelerators upon the sulphur coefficient and the physical properties of the

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[1] Published by courtesy of the American Chemical Society. Paper read before the Rubber Division of the Society at St. Louis, Missouri, April 12-16, 1920:

[2] The Falls Rubber Co., Cuyahoga Falls, Ohio.

[3] The India-Rubber Journal, 58 (1919), 527.

[4] Chemical and Metallurgical Engineering, 20 (1919), 417.

[5] Journal of the Society of Chemical Industry, 37 (1918), 156t.

[6] A qualitative determination showed the presence of nitrogen in the extracts of both rubbers.

[7] Herbert Wright, "Hevea Brasiliensis, or Pará Rubber," 1912, p. 439. London.

[8] Kolloid-Zeitschrift, 14 (1914), 268.

[9] Communications of the Netherland Government Institute for Advising the Rubber Trade and the Rubber Industry, Part II, p. 55.

[10] International Congress of Applied Chemistry, 25 (1912), 581.

[11] In a previous paper [The Journal of Engineering and Industrial Chemistry, 12 (1920), 317], we have mentioned that results obtained with certain synthetic organic substances indicate, in some cases, that the accelerator may be closely bound to the rubber. Should this also be found true in the case of the natural accelerator, the removal of this substance by extraction would markedly impair the physical properties of the sample after vulcanization, as well as slow down the rate of cure. (Compare with footnote 25.)

[12] "Variability in Plantation Rubber," Journal of the Society of Chemical Industry, 35 (1916), 715.

[13] Journal of the Society of Chemical Industry, 36 (1917), 365.

[14] The protein portion of this nitrogenous material which is insoluble in acetone and benzene has been shown to act as an accelerator (Beadle and Stevens, Kolloid-Zeitschrift, 11 (1912), 61; 12 (1913), 46; 14 (1914), 91). It has the further advantage of being present in relatively large amount as compared with the acetone-soluble constituent. As it does not, however, respond to magnesia to the same extent as the latter substance, and, as certain results (not included in this paper) indicate that the extraction with acetone does not cause a marked degradation of this protein material into the soluble variety, we have not made reference to it.

[15] Agricultural Bulletin Federated Malay States, 5 (1915), 38.

[16] German Patent 273,482 (November 22, 1912).

[17] The India Rubber World, 61 (1919), 137.

[18] It is interesting to note that Dekkar's figures for the nitrogen in the acetone extract of Hevea crêne (when calculated on a protein basis) are very close to the amounts of the accelerators employed in these experiments.

rubber after vulcanization. The action of these accelerators, *per se*, is another problem entirely. We are convinced, however, that in many instances both the action and effect of organic accelerators are dependent in great extent upon the presence of certain mineral substances in the mixture.

EXPERIMENTAL PART[19]

The experimental procedure was similar in all respects to that of our former experiments. Essentially it differs from that of Stevens only in the method of vulcanizing, and in the substitution of straight pieces for physical tests in place of the rings employed by him. The relative effects of vulcanization in steam and in a platen press are commented upon later.

Two samples of thin, pale, first latex crêpe (*Hevea*) were used. Sample 408 was from the lot of rubber that was used in our former experiments, while Sample 444 was chosen from another lot of equally good appearance, which was found to have different chemical and physical characteristics when employed in factory mixtures.

A partial analysis of the two rubbers gave the following results. No great importance, however, is attached to the figures for total nitrogen.

	No. 408, Per Cent	No. 444, Per Cent
Total ash	0.26	0.29
Acetone extract	2.62	2.99
Total nitrogen	0.19	0.20

The extra light magnesia (specific gravity 3.45) was the best grade obtainable. It lost 4.00 per cent on ignition, after which it contained 93.67 per cent MgO. Accelerator A was prepared by the condensation of an amine with formaldehyde and was C. P. grade.

The conditions of milling and making physical tests were identical with those previously employed, but, as comparisons were made after the method of Stevens, the physical properties of the different mixtures at break have been omitted.

Sulphur determinations were made by our method[20] in place of that of Rosenstein-Davies.[21] The coefficients represent the combined sulphur of vulcanization expressed as a percentage of the rubber in the mixture.

Throughout the work all cures were made in a platen press of the usual type. Stevens' samples were wrapped with cloth and vulcanized in steam.[22]

Experiment I. This work consisted virtually of a repetition of the previous work, using the sample of rubber (No. 408) previously employed, but substituting extra light magnesia for the heavy calcined material used in our former experiments. The

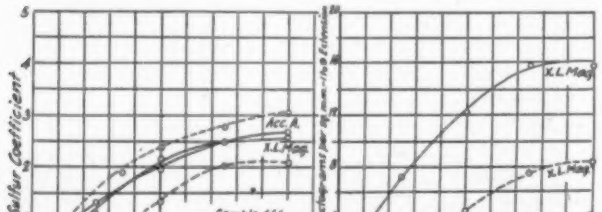

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Fig. 1. Relation Between Sulphur Coefficients and Amount of Accelerator, and Between Amount of Accelerator and Load Required to Effect a Given Extension

results are given in detail in Table I,[23] and the relation between sulphur coefficients and amount of accelerator is shown graphically in Fig. 1. The relation between the amount of accelerator and the load required to effect a given extension is also shown in Fig. I. In both cases these results confirm previous ones, even to the shape of the curves themselves. As has already been stated, if accelerators (such as our Accelerator A) are present in the mixture even in small amount, it is evident that the load required to effect a given extension is not a measure of the physical properties of the mixture, nor is it a reliable criterion of the rate of cure of the vulcanized mixtures.

Table I—Tests on Rubber No. 408

Accelerator	Accelerator Per Cent	Sulphur Coefficient		Load in Hectograms per Sq. Mm. to Effect Extension: 1 to 7		1 to 8		1 to 9	
		Actual	Excess	Actual	Excess	Actual	Excess	Actual	Excess
Extra light magnesia	Control	0.580	.....	0.34	....	0.42	....	0.50	....
	0.10	0.704	0.124	0.58	0.24	0.74	0.32	0.94	0.44
	0.25	0.916	0.336	1.03	0.69	1.37	0.95	1.98	1.48
	0.50	1.874	1.294	2.09	1.65	3.20	2.78	5.11	4.61
	0.75	2.553	1.973	3.03	2.69	4.84	4.42	8.17	7.65
	1.00	2.599	2.019	3.21	2.87	5.17	4.75	8.92	8.42
Accelerator A	Control	0.580	.....	0.34	....	0.42	....	0.50	....
	0.10	1.356	0.776	0.88	0.54	1.10	0.68	1.61	1.11
	0.25	1.987	1.407	1.70	1.36	2.25	1.83	3.57	3.07
	0.50	2.925	2.345	2.14	1.80	2.77	2.35	4.23	3.73
	0.75	3.309	2.729	2.16	1.82	2.72	2.30	4.32	3.82
	1.00	3.603	3.023	2.30	1.96	2.98	2.56	4.81	4.31

Experiment II. This consisted of a repetition of Experiment I upon Sample 444. The results are given in Table II, and the

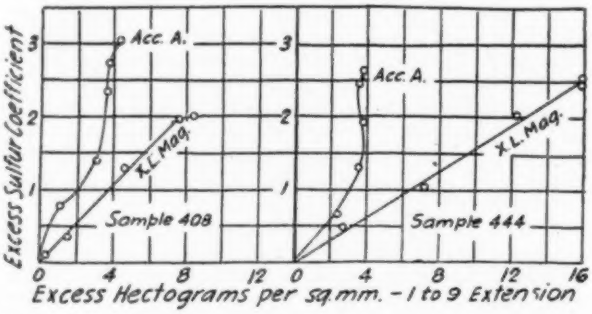

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Fig. 2. Relation Between Coefficient of Vulcanization and Load at a Given Extension

relation between sulphur coefficients and the amount of accelerator, and between the amount of accelerator and the load required to effect a given extension, are shown in Fig. 1. On the basis of the sulphur coefficients, Accelerator A and extra light magnesia appear to be of almost equal activity; or, conversely, Sample 444 vulcanizes at the same rate with either accelerator. When judged by the load required to effect a given extension, however, extra light magnesia appears to be much the more active. As it is now almost generally conceded that sulphur coefficients afford the most reliable indication of the state of cure, the load required to effect a given extension is again seen to be unreliable as an indication of the rate of cure of accelerated mixtures. These results have strengthened our former opinion that unless a complete series of stress-strain measurements are made, when

[19] In collaboration with Bernard J. Shapiro.

[20] The India Rubber World, 61 (1920), 356.

[21] The Chemist-Analyst, 15 (1916), 4.

[22] Stevens in his first paper on this subject has mentioned the possibility of a difference in the rate of cure of accelerated mixtures when vulcanized in dry heat. We have found similar mixtures which contained magnesia to show increasingly large sulphur coefficients when vulcanized, respectively, in dry heat, platen press, and open steam. This was not found to be true, however, for mixtures which contained organic accelerators. With the latter, results obtained in a platen press were frequently higher than those obtained in open steam. Evidently many organic accelerators are partially soluble in, or volatile with steam and, consequently, results obtained with these substances in open steam are apt to be low. This point is of considerable importance, and accounts in large part for the difference in the results obtained by Stevens and ourselves. We have found that most uniform results are obtained with samples encased in molds and vulcanized in open steam.

[23] The results obtained and shown in this table are somewhat higher than those originally found, and which were given in Table I of our former paper. This discrepancy may be attributed to a change in the rubber itself, as the sample used in the present instance had aged for over one year in roll form in a partially broken-down condition before the experiment was repeated. Also, the method previously employed for the estimation of combined sulphur was found to give slightly low results for mixtures which contained but small amounts of mineral substances.

the results of physical tests are taken as measure of the rate or state of cure of accelerated mixtures, such measurements must be made at or near the point of break of the respective mixtures. The effect of such small amounts of accelerators on the elongation of vulcanized mixtures has already been commented upon in our previous article. In contradistinction to Stevens' view, we do not regard the composition of a mixture as fixed when different accelerators are used, even if they are employed in amount less than 1 per cent on the rubber.

TABLE II—TESTS ON RUBBER NO. 444

Accelerator	Accelerator Per Cent	Sulphur Coefficient Actual	Sulphur Coefficient Excess	Load in Hectograms per Sq. Mm. to Effect Extension 1 to 7 Actual	1 to 7 Excess	1 to 8 Actual	1 to 8 Excess	1 to 9 Actual	1 to 9 Excess
Extra light magnesia	Control	1.009	.....	0.53	....	0.67	....	0.78	....
	0.10	1.482	0.473	1.55	1.02	2.08	1.41	3.44	2.66
	0.25	2.117	1.108	2.75	2.22	4.42	3.75	8.01	7.23
	0.50	3.132	2.123	3.88	3.35	7.09	6.42	13.08	12.30
	0.75	3.440	2.431	5.11	4.58	8.97	8.30	16.65	15.87
	1.00	3.552	2.543	5.14	4.61	8.37	7.70	16.69	15.91
Accelerator A	Control	1.009	.....	0.53	....	0.67	....	0.78	....
	0.10	1.678	0.669	1.49	0.96	2.04	1.37	3.21	2.43
	0.25	2.317	1.308	1.95	1.42	2.53	1.86	4.41	3.63
	0.50	2.938	1.929	2.20	1.67	3.05	2.38	4.62	3.84
	0.75	3.437	2.428	2.16	1.63	2.83	2.16	4.33	3.55
	1.00	3.685	2.676	2.40	1.87	3.19	2.52	4.64	3.86

In his second communication,[24] Stevens has drawn attention to the relationship between the coefficient of vulcanization and the load at a given extension. Our present results, for Samples 408 and 444, expressed in the same manner, are shown graphically in Fig. 2. It is at once evident in both cases that they differ markedly from the results obtained by Stevens. In the case of the mixtures which contained magnesia, the curves for both rubbers are practically straight lines up to coefficients of about 2.0 to 2.5, and, as Stevens has already noted, the excess load required to effect a given extension affords a fair measure of the rate of cure. In the case of Accelerator A, however, these curves are not straight lines, which shows that the load required to effect a given extension is not a measure of the rate of cure, as indicated by sulphur coefficients. Evidently, both rubbers vulcanize at almost the same rate when this accelerator is employed.

Both Stevens' and our own results are subject to the same interpretation. Our Accelerator A has been shown to decrease the load required to effect a given extension, namely, has increased the elongation as compared with extra light magnesia. It is quite possible, however, that Stevens' Accelerator I induced a greater resistance to extension under a given load than our Accelerator A. Furthermore, it is not entirely out of the question to select an organic accelerator which would actually increase the resistance to extension to more than that obtained with a similar quantity of extra light magnesia.

EXPERIMENT III. A comparison was made of the results obtained with the two rubbers before and after extraction with acetone.

A 10-gram sample of the rubber was sheeted thin and extracted with acetone in a Soxhlet apparatus for 36 hours. At the end of this time, the sample was dried *in vacuo* to constant weight and resheeted. The mixture was made by carefully sieving the required amount of sulphur and accelerator into the sheeted rubber and then rolling into a cylinder. The sample thus prepared was squeezed between the rolls of the mill to press the ingredients into the rubber without loss of either sulphur or accelerator. Subsequently, it was thoroughly mixed by resheeting and rerolling until a homogeneous mix was obtained. After the samples had been allowed to age for 24 hours they were vulcanized in a button mold in the platen press and the combined sulphur estimated in the usual manner. Owing to the small size of the samples,[25] no physical tests were made.

The results of this experiment are shown in tabular form in Table III. It is seen that, despite the small size of the samples employed, the results obtained with the unextracted rubbers are in good accord with those previously found for similar quantities of the accelerator (Tables I and II). In the case of the extracted rubbers, however, this was not true.

TABLE III

	Sample 408: Unextracted Rubber, Sulphur Coefficient	Sample 408: Unextracted Rubber, Excess Coefficient	Sample 408: Extracted Rubber (Ext. 36 Hrs.) Acetone Ext. = 2.62, Sulphur Coefficient	Sample 408: Extracted Rubber, Excess Coefficient	Sample 444: Unextracted Rubber, Sulphur Coefficient	Sample 444: Unextracted Rubber, Excess Coefficient	Sample 444: Extracted Rubber (Ext. 36 Hrs.) Acetone Ext. = 2.99, Sulphur Coefficient	Sample 444: Extracted Rubber, Excess Coefficient
Control ...	0.580	.....	0.831	.....	1.009	.....	1.000	.....
Extra light magnesia, 0.5 per cent	1.874	1.294	1.290	0.459	3.132	2.123	1.343	0.343
Accelerator A, 0.5 per cent	2.925	2.345	3.204	2.373	2.938	1.929	3.424	2.424

After extraction with acetone and vulcanization with the assistance of Accelerator A, Samples 408 and 444 were both found to have approximately (slightly higher) the same sulphur coefficients as were obtained with the unextracted rubbers, which have already been shown to be almost equal to each other. The extracted samples which were vulcanized with the assistance of extra light magnesia, however, gave entirely different results. Although the unextracted samples had sulphur coefficients of 1.874 and 3.132, respectively, the same mixtures, when prepared with acetone-extracted rubbers, had approximately the same sulphur coefficient, 1.3.

It would appear that Sample 444 differed from Sample 408 quite markedly in the nature or condition of its acetone-extractable components. Although we recognize that the extraction with acetone may not be without effect upon the rubber or upon the extraneous substances left in the rubber, it would appear that, if the acetone-soluble substances are removed, not only is the response of the two rubbers to the accelerating influence of extra light magnesia decreased in both instances, but also the excess sulphur coefficients obtained are small and almost equal. The excess coefficients obtained were, indeed, so little above their controls that it would appear that a more complete removal of these extraneous substances would prove extra light magnesia to be almost inactive as an accelerator. As Accelerator A functions equally well with both rubbers, either before or after extraction, when judged on the basis of the sulphur coefficients obtained, the results obtained with it require no further comment.

Final emphasis is placed upon the fact that all results were obtained with mixtures of rubber, sulphur, and accelerator only, and that the amounts of accelerators employed were small in all instances.

CONCLUSIONS

In view of the above experimental results, we are warranted in drawing the following conclusions:

I—The activity of small amounts of magnesia as an accelerator is largely of a secondary or contributory character, and acts in conjunction with, or obtains a response from, certain extraneous substances (probably nitrogenous) present in the rubber.

II—The activity of small amounts of magnesia is limited by the amount and nature of these extraneous substances originally present in the rubber.

[24] Loc. cit.

[25] It was obvious that the physical properties of the control mixture and the mixture which contained magnesia were very inferior to similar mixtures of unextracted rubber. This was not true, however, for the mixture which contained Accelerator A; the physical properties of this mixture were good and not greatly below a similar mixture prepared from unextracted rubber.

The Effect of Compounding Ingredients on the Physical Properties of Rubber[1]

By C. Olin North

RUBBER COMPOUNDING

It is generally realized that the compounding of rubber is more or less of an art. It depends solely on a large number of uncorrelated and apparently unrelated facts. It is hoped that in time this art will become a science with facts, theories and laws so well substantiated that guess work and experiments will be reduced to a minimum.

Before this ideal condition can be attained both rubber testing and compounding must make considerable progress. Tensile strength and ultimate elongation are important but tell only a very small part of the whole story. Tests are needed which will give us true measures of hardness, toughness, plasticity, resiliency, internal friction, hysteresis, and many other properties.

The purpose of this paper is to present some data as to the effect of certain common compounding ingredients on rubber and to propose a method of visualizing the peculiar behavior of these substances.

It should be mentioned in the beginning that the tests on which this work is based are very crude from the standpoint of scientific accuracy but it is believed that the values obtained, the curves, etc., are relative and as such will be more or less of interest to other rubber technologists.

COMPOUNDING EXPERIMENTS

It was realized in the beginning that the usual weight method of compounding was not only valueless but misleading. Consequently a basis of 100 volumes of rubber was chosen to which were added volumes of the different fillers varying from zero to fifty.

In the first experiments it was thought desirable to use a small quantity of accelerator, for which purpose thiocarbanilide was selected. Later this practice was discontinued and in all but two of the experiments (barytes and zinc oxide) described below, no curing agent other than sulphur was employed. A selected grade of pale crêpe was used with all fillers except barytes. Stocks were prepared on small experimental mixing rolls and sheets were vulcanized in the usual manner, in molds maintained at 140 degrees C. in a hydraulic press. Physical tests were performed on a Cooey testing machine.

Some years ago Dr. Warren K. Lewis called our attention to the fact that we were measuring tensile strength at the expense of ultimate elongation. In the present methods of testing, tensile strength is figured on the area of the test piece under no load. This is very unfair to a stock high in rubber since the actual area at break is considerably smaller than the original area and the relative decrease in cross-section of a soft stock is much greater than for one heavily loaded.

TENSILE STRENGTH AT BREAK

Assuming that the volume of a stock remains constant throughout elongation, it can be readily shown that the tensile at break can be arrived at by multiplying the tensile strength figured on the area at rest, by the final length and dividing by the original length. Thus,—

Let L = the load necessary for rupture
W = width of a test piece before stretching
d = distance between the marks
t = thickness of the test piece
V = the volume = wdt
T = tensile figured on cross-section at rest
T' = tensile at break

Let $w'd't$ and V' represent the respective dimensions at break

Since $V = V'$ by assumption, then $wdt = w'd't'$

$$T = \frac{L}{wt} \qquad T' = \frac{L}{w't'}$$

$$\therefore Twt = T'w't'$$

$$\text{and } T' = \frac{Twt}{w't'} \qquad \text{But } wdt = W'd't'$$

$$\therefore \frac{wt}{w't'} = \frac{d'}{d}$$

$$\text{Substituting, } T' = \frac{T \times d'}{d}$$

Unfortunately the volume of a test piece does not remain constant during elongation as has been shown by Schippel.[2] Consequently a correction factor should be used if absolute accuracy is desired.

Another method of taking into account the decrease in area and the corresponding increase in length is by Stevens' "tensile product," which is obtained by multiplying the ultimate elongation by the tensile strength as usually calculated. When dealing with hard rubbers where the elongation is practically zero, this method is absurd since the tensile product becomes zero. However, on soft stocks it is a satisfactory unit of comparison. It is convenient when working in English units to divide by 10,000. Tensile product is a less logical method of attack than tensile at break but since the curves, when plotted against volumes of filler, are parallel and the former is rather generally used by rubber technologists this unit was chosen for the comparisons given below. Correction factors are necessary for absolute accuracy as in the case of tensile at break, but in our experiments we did not use them, partly because of the small error introduced by volume change of the test piece and partly because of the lack of information about this phenomenon.

[1] Read before the Rubber Division of the American Chemical Society, at the St. Louis meeting, April 12-16, 1920.
[2] Industrial and Engineering Chemistry, Vol. 12—1, page 33.

TABLE I

DATA ON BARYTES (Ground White)

Ratio Vol. Barytes to 100 Vol. Rubber	Per Cent by Weight				Per Cent by Volume		Best Cure at 40 lbs. Steam	Tensile Strength Lbs. Sq. In.	Elong. Per Cent	Permament Set Per Cent	Tensile Product T x E ÷ 10,000	Values Corrected to 100 Volumes of Rubber		
	Rubber	BaSO4	S	Thiocanbanilide	Rubber	BaSO4						Tensile Strength Lbs. Sq. In.	Elong. Per Cent	Tensile Product
0.5	89.5	2.03	5.58	2.79	99.5	.5	1 hr. 45 min.	1805	925	10	167	1820	930	168
1.	87.7	3.99	5.48	2.74	99.	1.	1 hr. 55 min.	2065	975	10	202	2090	986	204
2.	84.5	7.66	5.28	2.64	98.1	1.9	1 hr. 35 min.	2055	988	10	203	2090	1005	207
3.	81.3	11.09	5.06	2.53	97.1	2.9	1 hr. 55 min.	1790	950	10	170	1841	988	175
6.	73.2	19.9	4.58	2.29	94.4	5.6	1 hr. 55 min.	1712	950	10	163	1820	1005	173
8.	68.6	24.95	4.29	2.15	92.6	7.4	1 hr. 55 min.	1960	975	10	191	2120	1050	206
11.	62.6	31.5	3.92	1 96	90 1	9.9	1 hr. 45 min.	1732	950	15	165	1930	1055	183
15.	56.3	38.4	3.52	1.76	87.0	13.0	1 hr. 45 min.	1805	950	20	172	2080	1090	198
20.	49.9	45.45	3.12	1.56	83.4	16 6	1 hr. 45 min.	1695	900	20	153	2030	1080	184
25.	44.8	51.	2.8	1.4	80.	20.	1 hr. 45 min.	1638	925	25	151	2040	1158	189
30.	40.1	56.1	2.51	1.26	76.9	23.1	1 hr. 45 min.	1398	825	25	115	1820	1075	150
35.	37.2	59.2	2.36	1.18	74.1	25.9	1 hr. 35 min.	1328	788	25	105	1790	1060	142
40.	34.4	62.3	2.19	1.1	71.4	28.6	1 hr. 45 min.	1325	788	30	104	1860	1105	146
45.	31.8	64.9	2.18	1.09	68.9	31.1	1 hr. 35 min.	1332	738	25	98	1935	1070	142
50.	29.55	67.6	1.88	.94	66.7	33.2	1 hr. 45 min.	1300	713	35	93	1950	1070	140

TABLE II

Data on Tripoli

Ratio Vol. Tripoli to 100 Vol. Rubber	Per Cent by Weight: Rubber	Per Cent by Weight: Tripoli	Per Cent by Weight: Sulphur	Per Cent by Volume: Rubber	Per Cent by Volume: Tripoli	Best Cure 40 Pounds Steam	Tensile Strength Lbs. Sq. In.	Elong. Per Cent	Permament Set Per Cent	Tensile Product T x E ÷ 10,000	Values Corrected to 100 Volumes of Rubber: Tensile Strength Lbs. Sq. In.	Elong. Per Cent	Tensile Product
0.5	90.8	.91	8.27	99.5	.5	2 hr. 30 min.	2660	913	13	243	2670	918	244
1.	90.1	1.79	8.19	99.	1.	2 hr. 45 min.	2775	900	15	249	2800	910	251
3.	86.9	5.17	7.9	97.1	2.9	2 hr. 45 min.	3110	875	15	272	3200	900	280
6.	82.6	9.85	7.5	84.4	5.6	2 hr. 45 min.	2960	850	25	252	3140	900	269
8.	80.	12.7	7.26	92.6	7.4	2 hr. 45 min.	2810	813	20	228	3030	876	246
11.	76.3	16.8	6.95	90.1	9.9	2 hr. 15 min.	2530	725	25	183	2800	804	203
15.	71.9	21.5	6.54	87.	13.	2 hr. 30 min.	2275	700	20	159	2620	805	183
20.	67.1	26.7	6.11	83.4	16.6	2 hr. 45 min.	2000	625	35	125	2400	750	150
25.	62.9	31.3	5.72	80.	20.	2 hr. 30 min.	1985	538	35	107	2480	670	134
30.	59.3	35.4	5.4	76.9	23.1	2 hr. 15 min.	1700	588	42	100	2210	765	130
35.	56.	39.	5.1	74.1	25.9	2 hr. 45 min.	1550	450	35	70	2090	608	94
40.	51.5	43.9	4.69	71.4	28.6	2 hr. 15 min.	1400	388	35	54	1970	540	76
45.	48.8	46.8	4.44	68.9	31.1	2 hr. 15 min.	1280	310	25	40	1860	455	58
50.	46.4	49.5	4.24	66.7	33.2	2 hr. 45 min.	1342	310	30	42	2010	460	63

TABLE III

Data on Lithopone

Volume Lith. to 100 Vol. Rubber	Per Cent by Weight: Rubber	Per Cent by Weight: Lithopone	Per Cent by Weight: Sulphur	Per Cent by Volume (Neglecting S): Rubber	Per Cent by Volume (Neglecting S): Lithopone	Best Cure at 40 Lbs. Steam	Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Permanent Set Per Cent	Tensile Product	Values Corrected to 100 Volumes of Rubber: Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Tensile Product
.0	91.	.0	9.	100.	....	2 hr. 15 min.	2660	940	6	250	2660	940	250
2.	83.9	7.58	8.39	98.1	1.9	2 hr. 30 min.	2645	860	8	228	2700	875	232
6.	72.9	19.83	7.29	94.4	5.6	2 hr. 40 min.	2450	840	8	206	2590	891	219
11.	62.5	31.1	6.25	90.1	9.9	2 hr. 30 min.	2340	820	10	192	2590	908	213
15.	56.1	38.1	5.61	87.	13.	2 hr. 40 min.	1910	790	16	151	2200	910	174
20.	49.9	45.1	4.99	83.4	16.6	2 hr. 30 min.	1970	810	16	160	2370	973	192
25.	44.7	50.9	4.47	80.	20.	2 hr. 30 min.	2020	740	16	150	2520	927	188
30.	40.6	55.4	4.06	76.9	23.1	2 hr. 30 min.	1960	690	20	135	2550	898	176
35.	37.3	59.	3.73	74.1	25.9	2 hr. 30 min.	1595	630	26	101	2150	848	136
40.	34.5	62.1	3.45	71.4	28.6	2 hr. 30 min.	1525	600	16	92	2140	841	129
45.	31.9	65.	3.19	68.9	31.1	2 hr. 20 min.	1355	545	22	74	1970	794	108
50.	29.7	67.4	2.97	66.7	33.2	2 hr. 40 min.	1495	570	18	85	2240	855	128

TABLE IV

Data on Magnesium Carbonate

Ratio Volumes $MgCO_3$ to 100 Vol. Rubber	Per Cent by Weight: Rubber	Per Cent by Weight: $MgCO_3$	Per Cent by Weight: Sulphur	Per Cent by Volume: Rubber	Per Cent by Volume: $MgCO_3$	Best Cure at 40 Lbs. Steam	Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Permanent Set Per Cent	Tensile Product	Values Corrected to 100 Volumes of Rubber: Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Tensile Product
.0	91.	.0	.9	100.	.0	2 hr. 15 min.	2660	940	6	250	2660	940	250
2.	87.5	3.76	8.75	98.1	1.9	1 hr. 50 min.	3120	850	8	266	3180	866	271
6.	81.4	10.5	8.14	94.4	5.6	1 hr. 40 min.	3480	810	16	282	3690	860	299
11.	74.85	17.69	7.48	90.1	9.9	1 hr. 40 min.	3480	770	32	242	3480	855	269
15.	70.3	22.7	7.03	87.	13.	1 hr. 50 min.	3320	790	44	262	3820	908	302
20.	65.4	28.	6.54	83.4	16.6	1 hr. 40 min.	2920	685	52	200	3500	822	241
25.	61.1	32.8	6.11	80.	20.	1 hr. 20 min.	2670	630	44	168	3340	788	210
30.	57.4	37.	5.74	76.9	23.1	1 hr. 20 min.	2170	505	48	110	2830	658	144
35.	54.	40.6	5.4	74.1	25.9	1 hr. 20 min.	1950	455	42	87	2630	600	117
40.	51.1	43.8	5.11	71.4	28.6	1 hr. 20 min.	1670	350	32	58	2340	490	81
45.	48.3	46.8	4.83	68.9	31.1	1 hr. 20 min.	1695	305	44	52	2470	440	76
50.	45.9	49.5	4.59	66.7	32.2	1 hr. 20 min.	1695	210	48	36	2540	315	54

TABLE V

Data on Zinc Oxide

Ratio Volumes ZnO to 100 Vols. Rubber	Per Cent by Weight: Rubber	Per Cent by Weight: ZnO	Per Cent by Weight: Sulphur	Per Cent by Weight: Thiocarbanilide	Per Cent by Volume: Rubber	Per Cent by Volume: ZnO	Best Cure at 40 Lbs. Steam	Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Permanent Set Per Cent	Tensile Product	Values Corrected to 100 Volumes of Rubber: Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Tensile Product
.0	90.	....	10.	....	100.	.0	2 hr. 15 min.	2560	890	4	228	2560	890	228
.5	86.3	2.55	7.76	3.33	99.5	.5	45 min.	3120	750	5	234	3140	755	235
2.	80.21	9.46	7.2	3.08	98.1	1.9	40 min.	3140	735	8	231	3200	750	235
4.	73.3	17.3	6.58	2.82	96.25	3.75	40 min.	3060	690	7	211	3180	718	220
6.	67.42	23.86	6.06	2.6	94.4	5.6	50 min.	3290	705	10	232	3490	746	246
11.	56.21	36.54	5.05	2.16	90.1	9.9	35 min.	3295	690	16	228	3660	765	252
15.	49.65	43.92	4.46	1.91	87.	13.	35 min.	3295	656	17	216	3790	755	249
20.	43.32	51.04	3.88	1.68	83.4	16.6	35 min.	3070	655	22	201	3690	786	241
25.	38.39	56.7	3.45	1.48	80.	20.	35 min.	3000	585	24	176	3750	732	220
30.	34.5	61.1	3.1	1.29	76.9	23.1	35 min.	2900	550	26	159	3770	715	207
35.	31.31	64.61	2.82	1.21	74.1	25.9	35 min.	2795	510	29	143	3770	687	193
40.	28.7	67.7	2.58	1.10	71.4	28.6	35 min.	2285	485	27	111	3210	680	156
45.	26.45	70.2	2.38	1.02	68.9	31.1	50 min.	2140	455	32	97	3110	660	142
50.	24.48	72.28	2.19	.94	66.7	33.2	35 min.	2105	450	30	95	3160	675	142

TABLE VI

Data on Gas Black

Ratio Volumes of Black to 100 Vol. Rubber	Per Cent by Weight: Rubber	Per Cent by Weight: Black	Per Cent by Weight: Sulphur	Per Cent by Volume: Rubber	Per Cent by Volume: Black	Best Cure at 40 Lbs. Steam	Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Product T x E. ÷ 10,000	Permanent Set Per Cent	Values Corrected to 100 Volumes of Rubber: Tensile Strength Lbs. Sq. In.	Elongation Per Cent	Tensile Product
.0	90.	.....	10.	....	....	2 hr. 30 min.	2600	900	2340	6	2600	900	234
.5	90.2	.83	9.	99.5	.5	2 hr. 45 min.	2720	920	2500	10	2740	925	251
2.	88.	3.23	8.8	98.1	1.9	2 hr. 45 min.	2880	840	2420	13.5	2930	855	247
4.	84.8	6.2	8.5	96.2	3.8	3 hr. 00 min.	2900	820	2388	14	3020	853	247
6.	82.5	9.13	8.25	94.4	5.6	2 hr. 45 min.	2940	790	2320	15	3120	838	246
8.	80.2	11.8	8.	92.6	7.4	3 hr. 00 min.	3040	780	2370	17	3280	843	256
11.	76.8	15.6	7.68	90.1	9.9	3 hr. 00 min.	3260	760	2480	22.5	3620	843	275
15.	72.5	20.2	7.25	87.	13.	3 hr. 00 min.	3420	700	2390	27	3940	805	275
20.	68.2	24.8	6.8	83.4	16.6	2 hr. 45 min.	3770	640	2410	32.4	4530	770	279
30.	60.5	33.5	6.0	76.9	23.1	2 hr. 45 min.	3800	545	2070	40	4940	710	269
35.	57.3	36.9	5.7	74.1	25.9	2 hr. 45 min.	3700	510	1890	43	4980	688	255
40.	54.4	40.2	5.4	71.4	28.6	2 hr. 30 min.	3480	410	1430	40	4880	575	200
45.	51.8	43.	5.18	68.9	31.1	2 hr. 30 min.	3420	365	1250	46	4980	530	182
50.	49.4	45.6	4.9	66.7	33.2	2 hr. 45 min.	3300	320	1055	48	4950	494	158

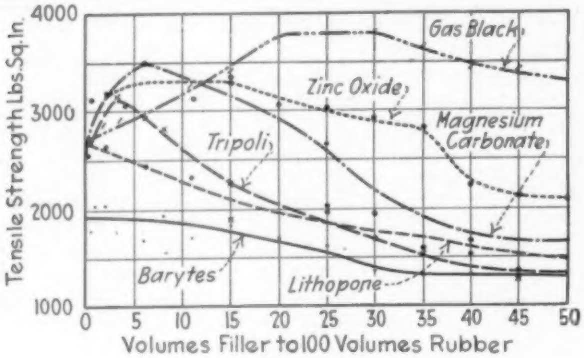


Fig. 1

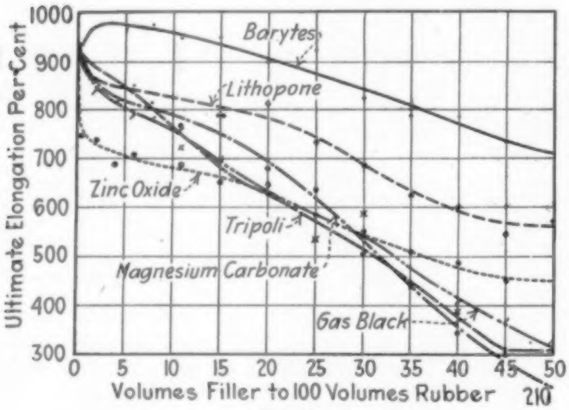


Fig. 2

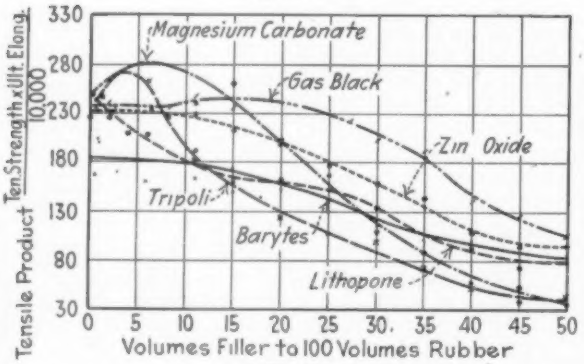


Fig. 3

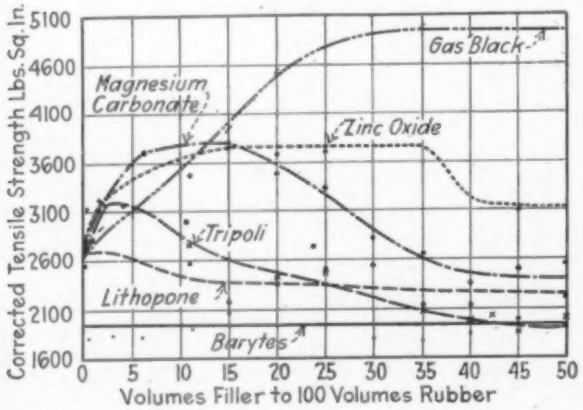


Fig. 4

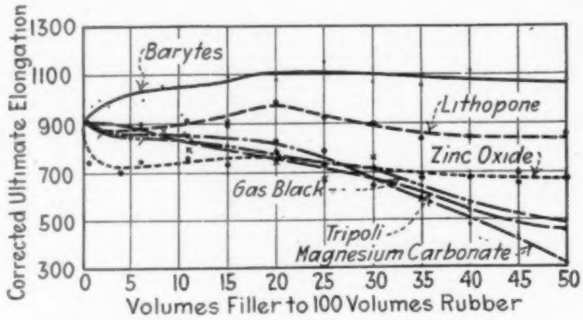


Fig. 5

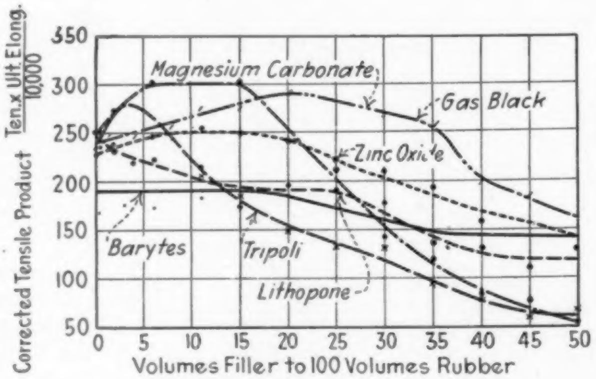


Fig. 6

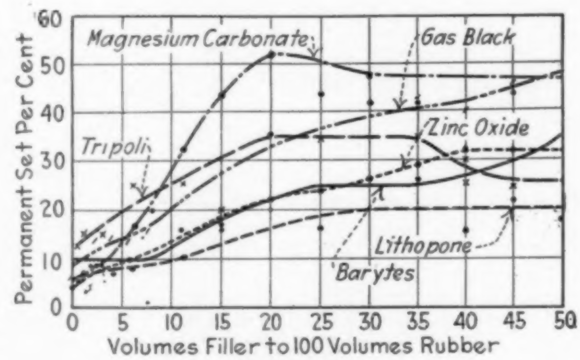


Fig. 7

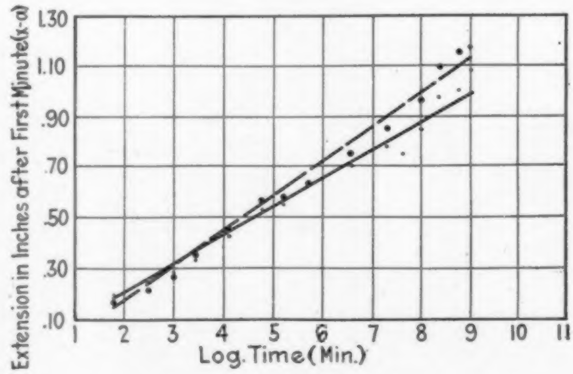


Fig. 8

In order to ascertain the effect of the different fillers on the rubber, the device of figuring tensile strength, ultimate elongation and tensile product back to the actual volume of rubber present was tried out and found to be of value.

The present state of compounding demands a simple procedure whereby fillers can be compared with regard to their effect on rubber regardless as to how that effect is produced.

Assuming that the effective area is that obtained by subtracting the area occupied by the particles of filler from the total area of the test piece one can refer the test back to the proportional quantity of rubber present by dividing the difference by the percentage by volume of rubber and multiplying by 100. For example, referring to Table IV we find that the stock containing 25 volumes of magnesium carbonate to 100 volumes of rubber (80 per cent rubber and 20 per cent $MgCO_3$ by volume) has a tensile strength of 2,670 pounds per square inch. The ultimate elongation is 630 per cent and the tensile product 168. Correcting these values to the relative quantity of rubber present by multiplying them by $100 \div 80$ gives 3,340 pounds per square inch as the corrected tensile, 788 per cent corrected elongation, and 210 as the corrected tensile product. The term "corrected" which is used throughout the paper always indicates that the value has been corrected back to a basis of 100 volumes of rubber.

Complete data of the various experiments are recorded in tables I to VI, inclusive. This information has been reduced to curves, Figs. 1 to 7 inclusive.

Barytes—You will note that this filler causes a continuous decline in tensile until 35 volumes to 100 volumes of rubber is reached. From this point the curve comes to a "flat."

Lithopone—This filler also causes a decided falling off in tensile.

Tripoli—Infusorial earth, etc., shows a maximum above 3,000 pounds per square inch at 3 volumes to 100 volumes of rubber after which there is a decided falling off, due perhaps to cutting action of the sharp particles.

Zinc Oxide—The variety used here was New Jersey Red XX. You will note that its curve comes up to a flat at 5 volumes to 100 volumes of rubber, remains constant until 15 volumes and then falls gradually until 35 volumes is reached. Beyond this point the fall is rapid.

Magnesium Carbonate—This filler comes up to a maximum at 6 volumes to 100 volumes of rubber and then falls off gradually.

Gas Black—The curve rises gradually to 20 volumes, remains constant until 30 volumes and falls off slowly.

ULTIMATE ELONGATION

Barytes—This filler stands out over all the others as having least effect on the elongation.

Lithopone—Is next to barytes.

Magnesium Carbonate, Gas Black and Tripoli—These all produce about the same falling off.

Zinc Oxide—This produces a somewhat greater drop in elongation, at the beginning of the curve.

TENSILE PRODUCT

Magnesium Carbonate—Shows the highest values but rapidly falls off when over 15 volumes are employed.

Gas Black—Holds practically constant until 20 volumes and then falls away.

Lithopone and Barytes—Both are quite low.

Tripoli—Comes up and then rapidly goes down, indicative that both tensile and elongation are markedly affected by increase in filler.

Zinc Oxide—Shows a rather steady falling off.

The above curves are satisfactory only as far as they go. The methods employed do not permit one to analyze the effects of the filler and to differentiate between simple decrease in tensile with decrease in rubber and increase in tensile due to some peculiar property or action of the filler. By using the corrected values we eliminate the effect of decreasing the actual rubber content of the stock.

TENSILE STRENGTH, CORRECTED VALUES

Barytes—It is remarkable how well the evidence supports the view that this filler has no effect on the stock. The straight line curve is not absolutely accurate considering the data but it is believed to be very close to the truth.

Lithopone—Falls off to about 2,400 pounds per square inch and then very gradually declines.

Tripoli—Shows the same behavior as in other curves which would indicate some peculiar behavior of the filler, probably a cutting action by the siliceous skeletons of the diatoms.

Zinc Oxide—Comes up to a maximum at 15 volumes and remains constant until 35 volumes is reached. At this point we have a decided falling off in corrected tensile. This value can be taken as the maximum quantity which may be added without overloading.

Magnesium Carbonate—Shows a maximum value from 6 to 15 volumes beyond which it shows a marked decline.

Gas Black—Shows a continued increase until 30 volumes is reached. Beyond this point the curve remains constant. Apparently black has a stiffening or toughening action on rubber.

ULTIMATE ELONGATION

Barytes and Lithopone—Have very little effect on the elongation. The values obtained are not far from those secured with pure gum.

Tripoli, Gas Black and Magnesium Carbonate—Show about the same effect, namely, a gradual decrease with increased filler.

Zinc Oxide—Gives a more or less flat curve which does not show such a marked decline as the others.

TENSILE PRODUCT (CORRECTED)

These curves require considerable study. The previous conclusions are substantiated.

Magnesium Carbonate—Is shown to give excellent results up to 15 volumes.

Gas Black—Increases the corrected tensile product up to 20 volumes after which the curve declines, thus indicating that the increase in tensile, as ordinarily figured, is more or less at the expense of elongation.

Zinc Oxide—Comes to a maximum at 11 volumes to 100 volumes of rubber.

Lithopone, Barytes and Tripoli—Function as before.

PERMANENT SET

On Fig. 7 data as to the relative permanent sets of the respective stocks are plotted. The method of obtaining permanent set was worked out by E. L. Davies and the writer and was described by my colleague in a letter accompanying the methods proposed by the Rubber Testing Committee.

The curves all show a decided increase in set, namely, plasticity, with increased filler. The very high set obtained with 20 volumes of magnesium carbonate explains why American compounders have not used this filler to any marked extent.

NETWORK STRUCTURE OF RUBBER

It is desirable for the better understanding of compounding phenomena to form a mental picture of the probable internal structure of rubber. The conception presented below is given solely as a vehicle for thought.

As a working hypothesis let us assume that vulcanized rubber consists of plastic material and elastic fibers. There is evidence that some such condition actually exists. For instance, elastic fibers are indicated by the following:

(1) It is well known that high-grade stocks have a noticeable grain when calendered, that is, they tear in the direction the stock has been run. This is as true for pure gum as for compounded stocks. Grain in rubber is somewhat analogous to grain in wood. See Table VII.

(2) Calendered stocks have higher tensile strength and lower ultimate elongation with the grain than across it.

(3) Previous stretching (see Bulletin No. 38, Bureau of Standards) increases tensile strength. See Tables VIII and IX.

That plastic material is present is indicated by:

(1) Test pieces in which a set has been developed tend to recover their original length. Set decreases with time after release. Pure gum recovers in 8 hours 75 per cent of the original set (measured after 10 minutes). See Table X.

(2) Schwartz (Schidrowitz, "Rubber," page 241) pointed out that elongation under constant load follows the equation:

$$x = a + b \log t$$

when x = elongation at the end of an interval of time t
a = elongation at the end of the first minute
b = a constant depending on the plastic flow of the stock.

EXTENSION

Fig. 8 shows $(x—a)$ plotted against $\log_e t$ for a heavily loaded black stock under 25 pounds load. The curve is a straight line which shows that the equation actually holds.

This indicates that rubber consists in part of a plastic substance which may be regarded as a supercooled liquid which probably forms a matrix for the elastic fibers.

(3) That the set is due to plastic material is indicated by the fact that it is decidedly increased when a material known to be plastic, as for example mineral rubber, is added.

Returning to the hypothesis that rubber consists of plastic material and elastic fibers, it is recognized that the colloidal aggregates $(C_{10}H_{16})_x$, doubtless vary considerably in size. The chief difference between plastic and elastic matter would appear to be in the size of the aggregate.

Vulcanization produces a profound change in the properties of rubber. In the uncured condition it is weak and plastic. Properly vulcanized, it is strong, elastic and resistant to repeated flexing. The polymerizing influence of sulphur is well known in organic chemistry.

TABLE VII

Variation of Tensile Strength and Ultimate Elongation with Direction of Grain

Stock	No. 1	No. 2	No. 3
Tensile Strength			
Longitudinal	2.730 lbs. sq. in.	925 lbs. sq. in.	10.550 lbs. sq. in.
Transverse	2,675 lbs. sq. in.	625 lbs. sq. in.	3,160 lbs. sq. in.
Elongation Ult.			
Longitudinal	630 per cent	90 per cent	....
Transverse	640 per cent	210 per cent	....
	Cheap tread	Cheap mechanical	Asbestos packing

Is it not possible that the chief effect of vulcanization is the locking up or polymerization of these colloidal aggregates? Plastic material probably also unites with sulphur but since it is composed of much smaller aggregates the effect is not so marked. If this is the case we may regard vulcanized rubber as consisting essentially of a vast network of very fine fibers linked up and strengthened in some way by sulphur. This network extends throughout the plastic materials present and also completely surrounds and incloses any filling material that may be present in the stock. It is to this network that the writer attributes the desirable properties of rubber such as its strength, its elasticity, its resistance to repeated flexing and its ability to be compounded.

TABLE VIII

Stock	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Tensile strength, lbs. sq. in.						
Single stretch	2470	1740	990	1710	750	930
Repeated stretch	2610	1960	1180	1790	790	920
Ultimate elongation, per cent.						
Single stretch	645	665	510	460	430	375
Repeated stretch	765	780	645	555	440	465

(Bureau of Standards, Bulletin No. 38, page 41, Table 6.)

Carrying this picture farther let us consider an ordinary fishing net. Empty, it can be stretched out to a rather great length. But when it is full of fish it is no longer possible to alter the shape to anything like the previous extent. The fish act as struts and keep the sides of the net distended. If you will imagine many nets closely interwoven and embedded in plastic material, you have the writer's conception of rubber. When compounding material is introduced the net is distended and there is a strut action which prevents ready change of position.

Examples of similar conditions are found in reinforced concrete and in the mordanting or weighing of fabric. In the second case we have merely interposed particles among the fibers of the cloth in such a way that they are no longer free to move. In other words we have wedged them into position, consequently, the fabric has become stiffer, less pliable, and its tensile strength has been greatly increased.

Applying the same idea to a compounded stock it would appear that the increase in tensile strength of a stock produced by compounding ingredients is due to two principal effects:

First, that filling material so distends the network reinforcement of rubber that the stock becomes stiffer, less stretchy and its tensile strength as measured on the area at rest is increased because a greater area is presented at break.

The second and more important effect is due to the influence of the compounding ingredient on the closeness of weave of this net. Rubber doubtless contains colloidal aggregates of different lengths. When a coarse compounding ingredient is added, only the long fibers become effective in constructing the network around the particles. Consequently the resulting stock has a loose weave. It tears readily, the ultimate elongation is not greatly influenced and the tensile strength of the rubber has not been increased. A typical representative of this class is ground barytes.

TABLE IX

Effect of Repeated Stretching and Suspension Under Load on Tensile Strength and Ultimate Elongation

Stock: Compounded rather heavily; chiefly with gas black.

Tensile strength, lbs. per sq. in.:	
Single stretch	2960
Stretched twice to 75 per cent breaking elongation.............	3200
Suspended 135 hrs. under 25 lbs. load.........................	3950
Ultimate elongation per cent.:	
Single stretch	585
Stretched twice to 75 per cent breaking elongation.............	675
Suspended 135 hrs. under 25 lbs. load.........................	475

When the compounding material is very finely divided, the short colloidal aggregates also become effective in looping up the particles of filler. The more finely divided the ingredient the more fibers that are rendered effective. In this case the network reinforcement, is closely woven and contains the maximum number of loops, each of which is more or less wedged and anchored in place by the particle it incloses. The resulting stock is close grained. It does not tear easily and has a high tensile strength. Gas black is the best example of this type. It has perhaps the finest state of division of all compounding ingredients known to date and its effect on rubber is more marked than that of any other filler. Its tensile strength and tensile product values, when corrected back to the actual volume of rubber present, are exceptionally high. It produces, when properly handled, a closer grain than can be obtained with any other material. Zinc oxide is a close second to black in point of fineness and from a compounding standpoint its position is admittedly the same.

TABLE X

Decrease of Set with Time

Time After Release	A Per Cent	B Per Cent	C Per Cent	D Per Cent	E Per Cent	F Per Cent	G Per Cent
10 minutes	8	19	10	26	24	34	37
20 minutes	6	18	8	26	22	31	34
40 minutes	4	17	8	24	20	30	33
1 hour	4	17	8	24	20	30	33
2 hours	4	16	6	24	20	29	33
4 hours	2	16	6	23	20	28	32
6 hours	2	15	6	22	19	27	30
8 hours	2	15	6	22	18	27	30
Recovery in 8 hours..........	6	4	4	4	6	7	7
Recovery based on set in 10 minutes	75	21	40	15.4	25	20.6	19

Method—Stretched to 75 per cent the breaking stretch (ultimate elongation) held 10 minutes. Released and measured at intervals after release.

Stocks: A—pure gum; lbs. B—cheap friction; C—friction; D—low specific gravity tread; E—high specific gravity tread; F—cheap tread; G—mechanical.

The author wishes to thank Messrs. C. W. Bedford, E. L. Davies, and Dr. W. K. Lewis for many ideas and suggestions which have been incorporated into this paper.

What the Rubber Chemists Are Doing

FIREPROOFING AIRSHIP FABRICS[1]

The following notes are abstracted from a report by Guy Barr, B. A., B. Sc., of official tests on proofing airship fabrics against ignition by gum fire.

The special fabric (B. 29) under test was of treble cotton and rubber, and had been doped on the exterior surface with aluminum dust suspended in "soluble gun-cotton." Comparison of results was made with similar tests made on an ordinary yellow treble balloon fabric.

A rubbered fabric does not continue to burn if locally sparked, unless the heat supplied by the lighting agent plus that due to the small quantity of fabric consumed is sufficient to cause decomposition of the subjacent rubber. If the heat reaching the rubber is at any point too small to cause the distillation of volatile vapors therefrom, the conflagration is not transmitted to that point. The combustion of rubber requires a very much greater volume of air than that of cotton, and the supply of air being limited, the diffusion of the inflammable rubber decomposition products is the preponderating agent in the spread of the fire.

The wads used for these comparisons were made by cutting out disks of cardboard of the correct diameter from a sheet of such thickness that the effect of placing one of these disks on a piece of balloon fabric was the same as that caused by wads removed from a few .303-inch cartridges.

COMPARISON OF FABRICS

When the treble yellow fabric was compared with B. 29, it was found that the former was occasionally burnt completely through by the smoldering wad, and nearly always damaged as far as the innermost cotton layer. With B. 29 the dope was not only not a source of danger in this respect, but the fabric was actually somewhat protected. A wad would occasionally damage the innermost layer, but usually the outer two layers were alone attacked, and in no case was a hole burned right through. These results were further confirmed in the presence of hydrogen confined under a pressure of about an inch and a half of water by a piece of the fabric attached to a suitable vessel. In spite of repeated attempts the fabrics were not burnt through by the wad in either case, and even when, by the successive application of three or four wads, a hole had been burned, the gas which escaped did not catch fire. In fact, wads smoldering with sufficient energy to cause their complete combustion were found to be unable, at any rate in the half-dozen tests made under laboratory conditions, to ignite hydrogen or hydrogen-air mixtures.

In the above cases the damage done to the fabric by a smoldering wad was sufficient to cause a considerable local reduction of strength, together with a good deal of softening of the rubber. The position of the damage was, of course, readily visible by the blackening of the yellow fabric, but the aluminum-doped B. 29 showed very little trace of the incident on a cursory examination. It was only when the burnt spot was rubbed with a pencil or other moderately hard body that the white film of metallic powder was removed, and the scorching rendered visible.

FIRE RESISTANCE OF FABRICS

The resistance to fire of these fabrics is thus somewhat small, nor can any considerable protection be expected from any ordinary fireproofing, however efficient, applied to the different plies of cotton. After consideration it was decided that the most promising method of attack lay in the provision of an outer metallic coating. The attachment of metal foil appeared to offer almost insuperable difficulties, but the following method of procedure was found to afford a very gratifying measure of resistance to ignition by smoldering:

Various inventors have occupied themselves with the problem of spraying metallic coatings on woodwork, ironwork, etc., with the idea of forming a coat to resist atmospheric influences. The latest and most practical apparatus for the purpose is one due to Schoop, some details of the use of which are given in a paper by Morcom (Institute of Metals).

The principle of the method is briefly the feeding of a wire of the metal to an oxy-hydrogen blow-pipe flame, where the molten metal is atomized by a blast of air external to and concentric with the oxy-hydrogen flame. The particles of molten metal are rapidly cooled by the air-blast, and reach the surface to be coated at a temperature very slightly above or possibly below their melting-point. In virtue of their velocity, and perhaps also of their high temperature, they adhere firmly to the object to be coated. The cooling and scattering is sufficient to insure that no undue rise of temperature occurs on the sprayed surface.

A small sample of single rubbered fabric was sprayed with aluminum by this process in order to see whether the fireproofing was of any value. It was found that a smoldering wad which would burn a hole through a treble fabric scarcely affected this sample beyond slightly softening a small portion of the rubber. This effect was largely due to the heat conductivity of the metallic surface. The tensile strength of the sample was not affected by the spraying. It is therefore evident that the metallic particles are sufficiently small and well-cooled to do no damage to the cotton. This being the case, it is reasonable to conclude that the rubber, and hence the permeability will also be unaffected.

THE PRESERVATION OF VULCANIZED RUBBER[2]

The statement that vulcanized rubber kept in a tin box over a layer of ordinary kerosene remains in a serviceable condition for a much longer period than if kept in air, led Dr. H. P. Stevens to test the preservative effect of kerosene and other vapors. The results confirmed the claims made for kerosene vapor and also showed that water vapor has a similar or even more marked effect.

From experimental results, particularly the constancy of the acetone extracts after aging, it appears that the preservative action of water or kerosene vapor is due to an actual chemical preservation of the vulcanized rubber. These agencies inhibit or retard the chemical changes, including oxidation of the rubber, which normally take place when vulcanized rubber is aged in air, as shown by increase in weight and increase in acetone extract, but they do not retard the physical changes sometimes known as "after-vulcanization," as shown by the tensile strength and reduction of distensibility (reduced final strength) of test rings kept in air saturated with water vapor. We may therefore distinguish two changes which normally take place when vulcanized rubber ages: firstly, a physical change comprising an initial increase in tensile strength (if the specimen is not appreciably overcured), and a gradual reduction in final length; Secondly, a chemical deterioration, consisting mainly in an oxidation with a slight loss of sulphur in a volatile form. The extent of the chemical change is conditioned (1) by the coefficient of vulcanization, the higher the coefficient the more rapid the oxidation, (2) by the atmosphere surrounding the specimen,

[1]Reports and Memoranda, No. 178, (British) Advisory Committee for Aeronautics.

[2]Journal of the Society of Chemical Industry, July 31, 1920, page 251.

and (3) by the temperature. Doctor Stevens does not at this stage put forward a theory to account for the preservative action of the water vapor, as further experiments to this end are in progress.

CONCLUSIONS

1. The life of vulcanized rubber is prolonged by storing in air saturated with moisture or petroleum vapor. Even overcured rubber can be preserved by this means for six or seven months at tropical temperatures.

2. Preserved under these conditions, the acetone extract does not increase, showing that the rubber is protected from oxidation and decomposition. Nevertheless, the physical changes characteristic of "after-vulcanization" proceed normally.

3. In dry air the chemical change (oxidation) takes place more rapidly than in air containing moisture, and an increase in the acetone extract takes place.

4. As the oxidation of soft vulcanized rubber takes place the more rapidly the higher the coefficient, and is accompanied by an increase in the coefficient, and as vulcanized rubber, when perished, tends to become soluble in acetone, the percentage of combined sulphur or coefficient in such case should be based on the weight of the specimen after acetone extraction.

VISCOSITY OF RUBBER SOLUTIONS[1]

In investigating the viscosity of rubber solutions, the following method was used by the Delft rubber laboratories:

About one gram of the finely cut up rubber sample is placed in a hollow flask and shaken on the machine with 100 cc. chemically pure benzol, boiling point 80 degrees C, until the rubber is about 80 per cent dissolved. The solution is filtered through glass wool and the viscosity measured in Ostwald's viscosimeter, of the Fol type, at constant temperature, in diffused light. The first number is taken as the basis. The test is repeated in order to guard against errors. This always shows low values. The time taken to flow out divided by the time taken to flow out of pure benzol gives the relative viscosity. The concentration was determined by evaporating 25 cc. of the solution.

FACTORS INFLUENCING RESULTS

Influence of the Light and of the Discharge Through a Capillary on the Viscosity of Rubber Solutions. It is recommended that the work be carried out in a subdued light and to use the first observation of the viscosity.

Influence of Moisture and of Acid on the Viscosity of Rubber Solutions. While water appears to play no great part in the determination, acid, even in traces, must be kept out for a correct determination.

Influence of Incomplete Solution on the Viscosity of Rubber Solutions. The resins are more easily soluble than the rubber, therefore if the solution is not complete enough low viscosity numbers will be obtained, while if agitation is carried too far the nitrogen compounds dissolve and the viscosity is raised. In all cases the greatest part of the rubber must be dissolved, otherwise the viscosity numbers must be taken with reservation.

Influence of the Nature of the Solvent on the Viscosity of Rubber Solutions. It was found that the quotient of the relative viscosity of various rubbers for two different solvents is not constant, that it is proportionately greater with rubbers having high viscosities than with those of less viscosity. It is therefore important that the same solvent should be used if a comparison is to be made.

Influence of the Resinous Bodies on the Viscosity of Rubber Solutions. Extracted rubber shows a less viscosity than crude rubber. This is not a fact which applies to all cases. The separation of the resin causes this diminution of the viscosity or it may be the extraction treatment. In any case it is not possible from a solution of the resins on the one hand and the extracted rubber on the other by mixing these to form a mixture in which the original viscosity is raised.

Influence of Sulphur and Compounds on the Viscosity of Rubber Solutions. The simple mixing of sulphur and compounding materials does not change the viscosity. In the calculation it is only necessary to bear in mind the change of the concentration due to the compounding ingredients.

The Importance of the Viscosity Determination. There exists an actual relationship between the viscosity and the tensile strength. The viscosity also shows the important factors concerning the quality of the rubber.

The Measurement of the Swelling Power of the Rubber Gives Valuable Conclusions Concerning the Quality of the Rubber. However, as yet, not enough work has been done on this property to give definite results. The swelling power is proportional to the viscosity.

[1] Communications of the Netherland Government Institute for Advising the Rubber Trade and the Rubber Industry, Delft, Holland.

LABORATORY APPARATUS.

FLASK SHAKING DEVICE

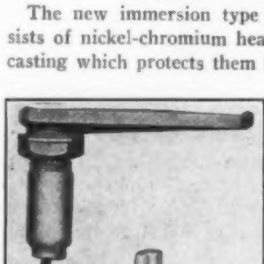
A patented device for securely clamping and shaking a half dozen flasks at one time is shown in the illustration. The size of the flasks held may vary from six to 24 ounces capacity. The use of this machine greatly facilitates the operations of solution or precipitation where much routine work of such character is involved.

Clamp Shaking Machine

The power required for operation of the apparatus is about one-sixth horse-power. The machine is arranged for attaching to a bench by screws and is connected by a round leather belt to a motor.—Eimer & Amend, 211 Third avenue, New York City.

IMMERSION HEATER FOR LABORATORY

The new immersion type water heater shown herewith, consists of nickel-chromium heating elements incased in a flat brass casting which protects them from mechanical injury, and making a simple and durable heater that is easily cleaned. When protected in this manner the life of the heating elements is increased, requiring less frequent renewals than with the ordinary immersion type heater.



Electric Water Heater

This heater is particularly useful in the chemical laboratory for heating or evaporating water in any shallow container, and may also be used with glue pots, paste kettles, sterilizers and other apparatus.

To install the heater, a 1¼-inch hole is drilled through the bottom of the container and the heater inserted from the top, so the extension through which the cord is run projects downward through the hole. Tightening the nuts and washers holds the heater rigid and prevents leakage.

By means of a snap switch on the heater cord three different heats may be obtained: 1,200 watts, 600 watts and 300 watts. Standard heaters are made for 110, 120, and 220 volts, and may

be used on direct-current or alternating-current circuits.—The Cutler-Hammer Manufacturing Co., Milwaukee, Wisconsin.

CHEMICAL PATENTS

THE UNITED STATES

Water-Proof Sheet and Process. A flexible, tough and substantially water-proof sheet of material made up of uniform intimately united layers, one of which is composed of nitro-cellulose and rubber, and the adjacent layer being composed of rubber.—Charles Weber, Newark, New Jersey, United States patent No. 1,350,533.

Coated Fabric and Process. The process consists in coating a fabric with rubber, applying a liquid coating constituting a clear vulcanizing varnish, embossing the coated fabric and then vulcanizing both coatings simultaneously.—John A. Wilson, Elizabeth, assignor to The Duratex Co., Newark, both in New Jersey. United States patent No. 1,352,163.

THE DOMINION OF CANADA

Ebonite Substitute Process consisting in dissolving vulcanized new rubber in drying oils to which melted paraffine wax, stearine, resin or similar products have been previously added, heating and mechanically mixing the mixture, subsequently adding finely divided absorbing filling material and vulcanizing to a soft elastic material.—The Naamlooze Vennootschap Nederlandsche Maatschappij tot Exploitatie van Optimietfabrieken, assignee of Salmon van Raap, both of Amsterdam, Holland. Canadian patent No. 202,817.

Tire Filler. A composition of matter consisting of any heavy vegetable oil, 32 pounds; oxide of magnesium, about one pound; ultra-marine, about two pounds; oakum, about one and one-half pounds; and chloride of sulphur, from six to ten pounds.—Irving Gray, Champion, Alberta, Canada. Canadian patent No. 202,966.

Coumarone Resin. The process of making coumarone resin which comprises polymerizing the polymerizable constituents of solvent naphtha boiling from 160-180 degrees C., settling, removing any sludge, distilling the unchanged solvent naphtha from the products of polymerization in subjecting the latter to distillation under a high vacuum whereby a hard resin is obtained.—The Ellis-Foster Co., Montclair, New Jersey, assignee of Louis Rabinovitz, Pomona, New York. Canadian patent No. 203,100.

Packing Ring. A molded and vulcanized piston packing ring comprising in its composition rubber, sulphur, short asbestos fiber, and ground sponge, the rubber constituting a minor proportion of the mass by weight.—The H. W. Johns-Manville Co., New York City, assignee of George Christensen, Plainfield, New Jersey. Canadian patent No. 203,356.

THE UNITED KINGDOM

Synthetic Resins. Polymerized coumarone, etc. The acid solution obtained by the treatment of solvent naphtha with sulphuric acid is neutralized by agitation with dry powdered alkali carbonate or alkaline earth carbonate. The agitation is frequently effected by injection of air. Alkali or alkaline earth peroxides may be added with the carbonate. The solution is clarified by standing, filtering, or centrifuging, and freed from volatile hydrocarbons by distillation.—G. S. Walpole, 121 Victoria street, Westminster, London. British patent No. 145,415, not yet accepted.

Compound Sheet Materials. A method of uniting two or more layers of dissimilar materials, particularly plastic materials which are difficult to stick together, as rubber with other plastic materials. For example, a gas proof and liquid tight fabric may be prepared by coating a fabric foundation with acetyl-cellulose as a gas proof layer, then applying the intermediate layer before the acetyl-cellulose is completely dry; and finally applying a liquid tight layer of nitro-cellulose.—Gesellschaft, fur Verwerthung Chemicher Produkte, 11 Ehrenbergstrasse, Berlin, Germany. British patent No. 145,544, not yet accepted.

GERMANY

Manufacture of Dimethyl-butadiene. Pinacone chlorhydrin is treated with compounds which will combine with hydrochloric acid but do not contain hydroxyl groups, namely, ammonia or organic bases. A mixture of water and dimethyl-butadiene is obtained by distilling a mixture of pinacone chlorhydrin and dimethylaniline between 60 degrees and 80 degrees C.—Farbenfabricken formerly F. Bayer & Co., German patent No. 319,505.

Vulcanization. Method for the acceleration of the vulcanization of caoutchouc.—Dr. Johann Francois Barthold van Hasselt, Rotterdam, Holland. German patent No. 325,306.

Substances Similar to Rubber. Method of manufacture.—Gustav Rath, 136 Feldstrasse and Dr. Erich Asser, 19 Ahornstrasse, both in Wandsbeck, Germany. German patent No. 327,913.

Caoutchouc Products. Method for the prevention of the oxidation of synthetic caoutchouc products.—Badische Anilin-und-Soda-Fabrik, Ludwigshafen, Germany. German patent application No. 85,671, February 26, 1918.

Synthetic Rubber. Method for the production of product similar to caoutchouc.—Badische Anilin-und-Soda-Fabrik, Lud-Farbenfabricken formerly F. Bayer & Co. German patent No. 319,505.

A NEW SOLVENT

In a recent communication to the American Chemical Society at St. Louis, Professor V. Leuber stated that the selenium oxychloride obtained as a waste product in the electrolytic refinery of copper has remarkable solvent properties. It dissolves all the unsaturated hydrocarbon such as acetylene, benzene, toluene, etc., while the paraffine hydrocarbons such as gaseous kerosene and the mineral waxes were unaffected. Some vegetable oils react violently with the selenium oxychloride. This easily dissolves vulcanized rubber as well as the unvulcanized material, and bakelite, waterproof casein glue, asphalt and bitumen also dissolve in the oxychloride. The reagent also extracts the bituminous material from soft coal, leaving a carbonaceous residue.

INTERESTING LETTERS FROM OUR READERS

GUTTA PERCHA IN THE PHILIPPINES

To the Editor:

Dear Sir:—

Are not the opportunities that await American rubber growers in the Philippines almost as great in the cultivation of gutta percha in that territory of the United States? Nearly all the gutta percha produced in the islands (and last year it was 38,030 kilos, valued at $18,476) was shipped to Singapore and thence to Europe and the United States. According to the Secretary of the Department of Commerce and Communications, a considerable export trade in gutta percha with the United States can be built up readily by having American buyers in the Philippines, by establishing a regular market in the United States for gutta percha, and by arranging for direct shipments.

Carlos Luz

Manila, P. I., September 10, 1920.

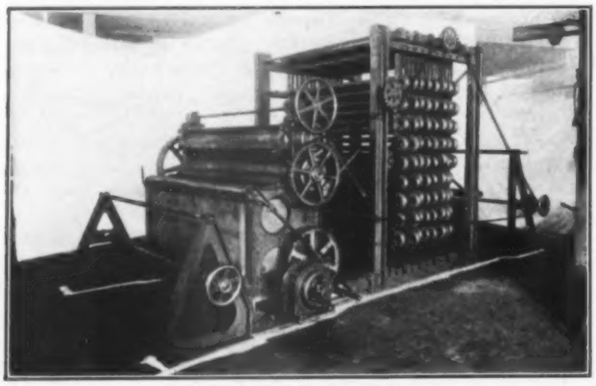
Gutta percha cultivation is of course possible and greatly to be desired. It would, however, be difficult to get capital to back it. The reason is that the tree is of exceedingly slow growth and many years must elapse before a profitable crop could be gathered. So far the only successful cultivation of gutta is that begun years ago by the Dutch in Java, the funds being supplied by the Government.—The Editor.

New Machines and Appliances

MACHINE FOR IMPREGNATING CORD TIRE FABRICS

Cord fabrics used in the manufacture of cord tires are impregnated with rubber solution before the skim coat is applied by the calender. That constant improvement is being made in the design and construction of impregnators is shown in the accompanying illustration.

The fabric from the stock roll is fed over a smoothing roller and into the tank, where it becomes saturated with the rubber solution. From the tank the saturated web passes between pressure rollers as adjusted, that the solution is forced into the interstices of the fabric in an even and thorough manner. The impregnated fabric is then passed in festoons between the steam-heated coils of the dryer, where the solvent is evaporated. While not a part of the equipment, a solvent recovery apparatus can be attached to this machine.



CORD FABRIC IMPREGNATOR

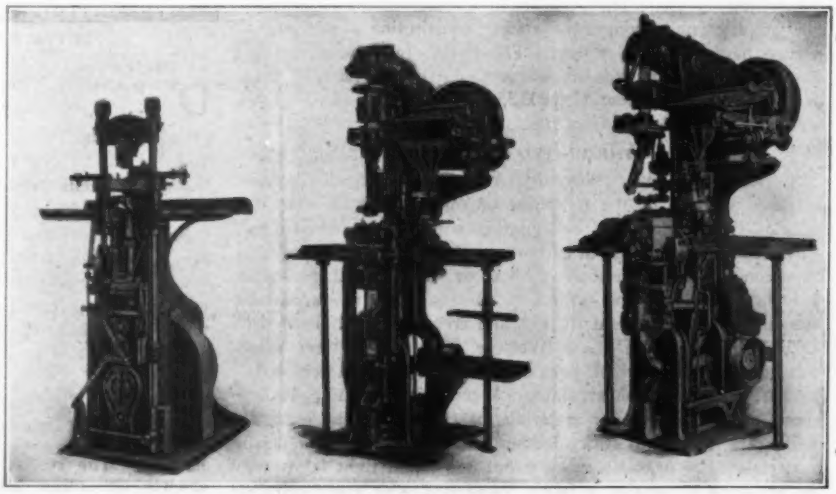
After drying the impregnated fabric is wound up on a stock shell and is ready for the final skim coat.—The Banner Machine Co., Columbiana, Ohio.

RUBBER HEEL ATTACHING MACHINES

Standard machines used for nailing, or for loading and attaching leather heels to shoes are shown herewith. All three can be equipped for rubber heel attaching in connection with rubber heels which have been laid out and constructed for machine attaching.

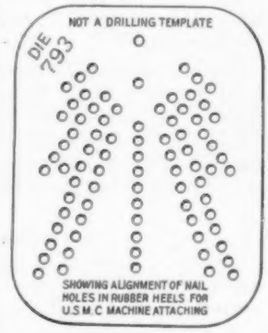
The type of machine selected is governed by the kind of shoe to be manufactured, the amount per day to be made, and the territorial conditions. It requires a complete special nailing outfit, in comparison with that used for leather heel attaching, this outfit being made from a heel of each size and style to be attached. The outfit includes a rubber heel locating ring which supports the heel while the nails are being driven, to prevent expansion of the heel, which would cause the location of nail holes to be changed.

The celluloid rubber heel template shows the proper alinement of the nail holes in rubber heels for machine attaching. This is a reproduction of the die on the heeling machine, and the celluloid template is in no way used as a drilling template or fixture. Any selection or grouping of nail holes may be made from this template for any size or style of rubber heel, using the back center hole for the men's sizes, and the front center hole, which is ½-inch ahead of the back hole, for women's sizes.



AMERICAN LIGHTNING NAILING MACHINE — MCKAY AUTOMATIC HEEL LOADING AND ATTACHING MACHINE, MODEL A — MCKAY AUTOMATIC HEEL LOADING AND ATTACHING MACHINE, MODEL B

As the compound used in heels by different rubber manufacturers varies considerably, the shrinkage in the finished heel varies. Therefore, in order to locate the washer pins in the heel molds correctly, a nailing should be selected from the celluloid template, each manufacturer figuring his individual shrinkage, and the washer pin in the mold located properly to compensate for this shrinkage, so that the holes in the finished rubber heel will line up with the holes in the template, as described above.—United Shoe Machinery Corporation, Albany Building, Boston, Massachusetts.



CELLULOID TEMPLATE

MACHINE FOR CUTTING SAMPLE TIRE SECTIONS

This device, according to the manufacturer, affords a great saving in labor, time and money over the old makeshift methods of cutting sample sections from tires. It cuts clearly through any tire section, fabric or cord, including the steel bead inserts ordinarily used. Each cut is accurate and true toward the center of the tire, clearly showing up the tire construction. It will handle any size tire up to and including an 8-inch cross-section. The maximum width of the sample cut is three inches. An entire tire can be cut up into samples without any waste.

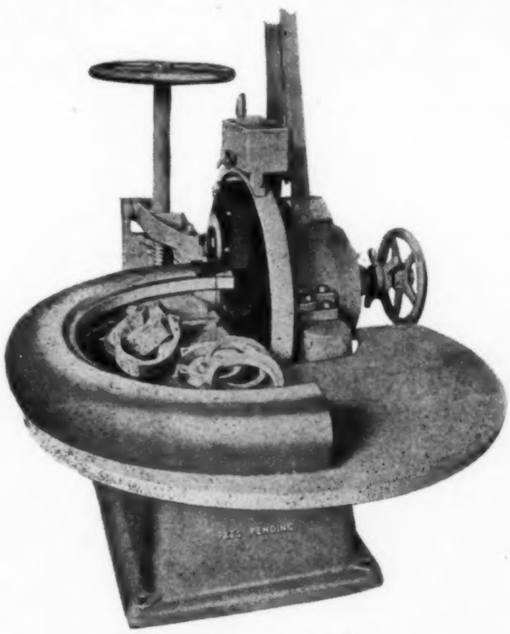
The machine is compactly built on a rigid base casting. The working table in front is adjusted for each size tire. The mandrel for holding the work is located above the end of the table and in line with the main bearing. The circular cutting knife rotates around the forward end of the mandrel.

The operation of the machine is simple. A mandrel of the correct size is set up and the circular knife is advanced into

contact with the mandrel. Then the limit stop on the right-hand side of the machine is set on the feed-screw. The tire is cut and the open end is placed over the mandrel, projecting a distance beyond the knife equal to the width of the sample desired. The vise is adjusted and closed, holding the tire firmly around the mandrel. The knife advances through the work to the limit setting of the feed-screw. A small amount of water from the water tank each minute insures easy cutting.

Each machine is supplied with two mandrels, for 3-inch and 4½-inch tires, and two circular cutting knives.

The manufacturer announces that the sample section cutter is not furnished with motor, but that a ½-h.-p. motor running at 1800 r. p. m. geared down to give a speed of 60 r. p. m. to the rotating knife may be used with it. A belt shaft is constructed to shift the belt on machines equipped with motors.—Peerless Machine Company, Racine, Wisconsin.



Sample Section Tire Cutter

BURT VENTILATORS FOR RUBBER FACTORIES

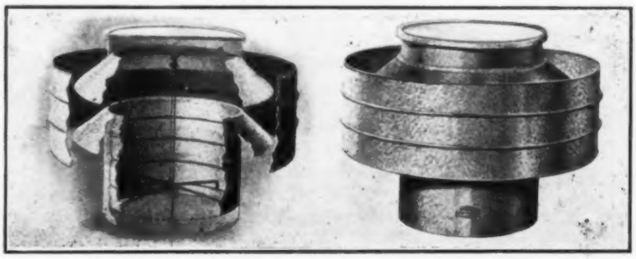
A decided improvement in ventilators is this new glass-top style. It should be of interest to all rubber manufacturers, not only as an aid in economically solving the problem of correct ventilation, but also as a means of securing better lighting facilities.

The ventilator is stationary and immovable. Impure air, steam or gas from the building is automatically drawn up and fresh air supplied without lowering the temperature inside too far for comfort. There is no other expense attached to the equipment outside of the original cost of the ventilators, which are simple in design and noiseless.

The damper is constructed in such a manner that the air shaft always remains free and open. Back currents of air are eliminated. At no time does the ventilator become clogged up with ice, snow or other substances. It is said that during calm weather any movement of the outer air is sufficient to cause an upward flow of air in the air shaft, thus drawing out the hot air and supplying fresh air.

Another advantage of the glass-top ventilator is the fact that the light cannot be shut off, even when the damper is closed. It is further affirmed that where this combination ventilator and skylight is used, no other form of skylight is necessary.

The ventilator is of heavy galvanized iron. The sectional view illustrates the ingenious way in which the damper is opened or closed. A cord attached to the damper is run through a small pulley suspended from the bar at the top. The damper itself is a rounded piece of galvanized iron fitted inside of the outer walls of the air shaft.—Burt Manufacturing Co., Akron, Ohio.



Glass-Top Ventilator
Sectional View Outside View

MACHINE FOR CUTTING HARD RUBBER COMBS

Dressing combs of hard rubber are molded in presses, and after vulcanization the teeth are cut on specially designed machines of the type shown in the illustration.

This machine feeds and stops automatically. The weight draws the comb down on the saw that cuts the first tooth, and a cam then raises the comb from the saw which is carried along the space for one tooth by a cam and rack. This continues until all the teeth have been sawed, when the machine stops. The rack and cam can be taken out and others substituted if a different number of teeth to the inch are to be sawed.

Dressing Comb Sawing Machine

These machines are usually operated in gangs, 15 machines being operated by one operator who can turn out under favorable conditions 1,200 to 1,500 dressing combs a day.

The machine for sawing teeth in fine combs also feeds and stops automatically. It is similar to the dressing comb sawing machine, except in size.—The College Point Mold & Engraving Co., 714 Seventh Avenue, College Point, Long Island, New York.

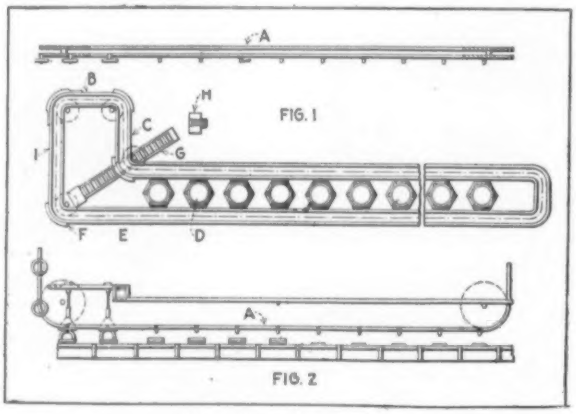
MACHINERY PATENTS

TIRE MOLD CONVEYING SYSTEM

This invention comprises a system of conveyors and mold-handling apparatus operating continuously, whereby the tire molds are filled, moved in and out of the vulcanizers, and the cured tires removed from the molds which are then cleaned and refilled. Referring to the illustration, Fig. 1 is a plan view at the plane of the vulcanizers, and Fig. 2 is a side elevation.

Suspended on hooks, the uncured tires and cores are successively delivered by the conveyor A to the loading station B, where they are placed in the molds. At station C the upper mold halves are lowered and registered with the lower halves, when the molds are delivered to the heaters D. At the same time molds are being discharged from the heaters and conveyed

to station E where they are opened, the upper halves being elevated by the conveyor. The tires are then removed from the molds at station F and placed on the conveyor G which de-



Tire Mold Conveyor

livers the tire to the stripping machine H. As the mold halves pass station I they are cleaned preparatory to receiving the uncured tires.—Carmon A. Meyers, assignor to Firestone Tire & Rubber Co., both of Akron, Ohio. Canadian patent, No. 200,863.

OTHER MACHINERY PATENTS

THE UNITED STATES

No. 1,350,696 Vulcanizing apparatus. O. F. Beck, Lawndale, and J. W. Speers and R. R. Jones, Akron, assignors to Firestone Tire & Rubber Co., Akron—all in Ohio.

1,350,722 Adjustable die for rubber-extruding machines. D. E. Goodenberger, assignor to Firestone Tire & Rubber Co.—both of Akron, O.

1,351,156 Two-part mold for solid rubber tires. C. and A. E. Burnett, Trowbridge, Eng.

1,352,099 Machine and method for building tires. W. C. Stevens, assignor to Firestone Tire & Rubber Co.—both of Akron, O.

1,352,160 Apparatus for forming hard rubber storage battery jars. T. A. Willard, Cleveland, O.

1,352,274 Collapsible tire core. F. L. Johnson, Akron, O.

1,352,383 Apparatus for manufacturing rubber bathing caps. R. E. Riley, assignor to The Miller Rubber Co.—both of Akron, O.

1,352,722 Apparatus for removing pneumatic tires from metal rims by fluid pressure. N. L. Caldwell, Knoxville, Tenn.

1,353,042 Retread vulcanizer. E. Harris, Los Angeles, Calif.

1,353,158 Tire mandrel and method of production. J. R. Gammeter, Akron, O., assignor to The B. F. Goodrich Co., New York City.

1,353,339 Apparatus for forming storage battery boxes. S. E. Hall, Akron, assignor of ⅓ each to E. R. Sloan, Maumee, and E. H. Workinger, Akron—all in Ohio.

1,353,383 Repair vulcanizing pad. J. N. Dieser, assignor of ½ to A. L. Silverstein—both of San Francisco, Calif.

1,353,477 Mold for making rubber tobacco pouches. F. F. Jamieson, Montreal, Que., assignor to Mechanical Rubber Co., Cleveland, O.

1,353,769 Apparatus for manufacturing solid rubber tires. C. Macbeth and W. E. Hardeman, Birmingham, assignors to The Dunlop Rubber Co., Limited, Westminster, London—all in England.

THE DOMINION OF CANADA

203,334 Machine governor. The Canadian Consolidated Rubber Co., Limited, Montreal, Que., assignee of B. E. Cederstrom, Detroit, Mich., U. S. A.

203,349 Calender shell for winding fabrics. The W. F. Gammeter Co., assignee of W. F. Gammeter—both of Cadiz, O., U. S. A.

203,350 Tire machine drum. The W. F. Gammeter Co., assignee of W. F. Gammeter—both of Cadiz, O., U. S. A.

203,367 Apparatus and method for making golf balls. The Paramount Rubber Consolidated, Inc., Philadelphia, Pa., assignee of F. T. Roberts, Cleveland, O.—both in U. S. A.

203,522 Tire mold. H. Raflovich, Buffalo, N. Y., U. S. A.

THE UNITED KINGDOM

145,041 Apparatus for making hollow rubber articles. Paramount Rubber Consolidated, 5232 Germantown avenue, Philadelphia, Pa., assignee of F. T. Roberts, 1051 Power avenue, Cleveland, O.—both in U. S. A. (Not yet accepted.)

145,515 Special apparatus for making fabric tires. The Goodyear Tire & Rubber Co., assignee of W. C. Tyler—both of Akron, O., U. S. A. (Not yet accepted.)

145,516 Special apparatus for making fabric tires. The Goodyear Tire & Rubber Co., assignee of E. G. Templeton—both of Akron, O., U. S. A. (Not yet accepted.)

145,590 Special apparatus for making fabric tires. The Goodyear Tire & Rubber Co., assignee of W. C. Tyler—both of Akron, O., U. S. A. (Not yet accepted.)

145,591 Special apparatus for making fabric tires. The Goodyear Tire & Rubber Co., assignee of W. B. Harsel—both of Akron, O., U. S. A. (Not yet accepted.)

145,679 Special apparatus for rotating mandrel in making fabric tires. W. B. Harsel, 1144 East Market street, and E. A. Nall, 152 Grand avenue—both of Akron, O., U. S. A. (Not yet accepted.)

145,680 Special apparatus for applying bead cores to partially built fabric tire covers. W. B. Harsel, 1144 East Market street, and E. A. Nall, 152 Grand avenue—both in Akron, O., U. S. A. (Not yet accepted.)

145,681 Special apparatus for making fabric tires. W. B. Harsel, 1144 East Market street, and E. A. Nall, 152 Grand avenue—both in Akron, O., U. S. A. (Not yet accepted.)

145,682 Special apparatus for making fabric tires. W. B. Harsel, 1144 East Market street, and E. A. Nall, 152 Grand avenue—both in Akron, O., U. S. A. (Not yet accepted.)

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145,685 Special apparatus for making fabric tires. W. B. Harsel, 1144 East Market street, and E. A. Nall, 152 Grand avenue—both in Akron, O., U. S. A. (Not yet accepted.)

146,337. Apparatus for vulcanizing tires and other rubber articles. The Goodyear Tire & Rubber Co., assignee of C. Wattleworth—both in Akron, O., U. S. A. (Not yet accepted.)

146,338 Device for separating mold sections as raised from well of hydraulic press. The Goodyear Tire & Rubber Co., assignee of W. K. Glennon and C. Wattleworth—all of Akron, O., U. S. A. (Not yet accepted.)

146,340 Special apparatus for making cores for beaded edges of tire covers. The Goodyear Tire & Rubber Co., assignee of W. B. Harsel—both of Akron, O., U. S. A. (Not yet accepted.)

14,6341 Tire mold. The Goodyear Tire & Rubber Co., assignee of W. C. State—both of Akron, O., U. S. A. (Not yet accepted.)

146,342 Mold for vulcanizing tires under internal pressure. The Goodyear Tire & Rubber Co., Akron, O., assignee of B. Darrow, Los Angeles, Calif. (Not yet accepted.)

146,343. Special apparatus for treading tires. The Goodyear Tire & Rubber Co., assignee of K. B. Kilborn—both of Akron, O., U. S. A. (Not yet accepted.)

146,344 Special apparatus for making fabric tires, the tread and sidewalls being treated before placed on the carcass. The Goodyear Tire & Rubber Co., Akron, O., assignee of B. Darrow, Los Angles, Calif.—both in U. S. A. (Not yet accepted.)

146,348 Apparatus for applying hard rubber base to metal foundation band of tires. The Goodyear Tire & Rubber Co., assignee of A. Weatherill—both of Akron, O., U. S. A. (Not yet accepted.)

GERMANY

PATENTS ISSUED, WITH DATES OF ISSUE

327,576 (September 16, 1916) Machine for making hollow vessels from rubber. W. W. Weitling, College Point, N. Y., U. S. A.

PROCESS PATENTS

THE UNITED STATES

No. 1,351,856 Manufacturing cushion tires. H. M. Lambert, Portland, Ore.

1,352,161 Forming hard-rubber storage-battery jars. T. A. Willard, Cleveland, O. (Original application divided.)

1,352,170 Manufacture of hard-rubber storage-battery jars. H. L. Boyer, assignor to Joseph Stokes Rubber Co.—both of Trenton, N. J.

1,352,258 Manufacture of garters. R. Gorton, Brookline, Mass.; C. W. Noyes administrator of said R. Gorton, deceased.

1,352,418 Manufacture of hard-rubber storage-battery jars. H. L. Boyer, assignor to Joseph Stokes Rubber Co.—both of Trenton, N. J.

1,352,738 Manufacture of boots and shoes with rubber soles, etc. H. C. Egerton, Ridgewood, N. J.

1,353,421 Manufacture of rubber bathing caps, etc. R. E. Riley, assignor to The Miller Rubber Co.—both of Akron, O.

1,353,621 Manufacture of porous insulating block with ribbed surface of fiber asbestos. H. A. Ashenhurst, assignor of 4/5 to J. J. Reynolds—both of Chicago, Ill.

THE DOMINION OF CANADA

203,433. Manufacture of hot-water bottle. M. B. Clarke, Akron, O., U. S. A.

THE UNITED KINGDOM

146,346. Joining ends of tire tubes. The Goodyear Tire & Rubber Co., assignee of C. B. Orr—both of Akron, O., U. S. A. (Not yet accepted.)

Leaky inner tubes come from a variety of causes. It may be that the valve plunger is worn or sticks; the lock-nut at the base of the valve stem may work loose; or running flat may honeycomb the inside of the casing with tiny holes. In running a tire soft or in changing it along the roadside, foreign substances get in between the rim and beads and work around next to the tube. Particles of rust off the rims also cut the tubes oftentimes. Though these holes are, as a general rule, too small to be seen by the naked eye, yet under pressure they will leak enough air to let a tire down fifteen to twenty pounds pressure in a week's time.—*Miller News Service.*

New Goods and Specialties

FOOTBALL SHOULDER PROTECTOR

The football hero of 1920 goes to battle as heavily armored as any knight of old, protectors of leather, felt and rubber replacing chain shirt and coat of mail. One of the newest safety appliances is a shoulder pad and protector made of heavy white felt, covered with best quality tan fabrikoid and reinforced with elastic flexible ribs of rubber tubing. The shoulder caps are of molded fiber, lined with white felt, with rubber cushions in the center to act as shock absorbers. This protector is very light and comfortable to wear.—Rawlings Manufacturing Co., St. Louis, Missouri.

Football Shoulder Pad

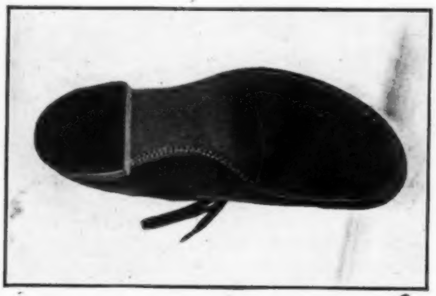
BETTER SHOES FOR BETTER FEET

The manufacturer of "Natural Tread" shoes recognizes the value of rubber heels as an essential of the perfect shoe. All of this company's shoes are equipped with low, broad heels of resilient rubber, and one model has in addition a rubber sole. "Natural Tread" shoes are considered by the maker to conform more nearly to the shape of the normal foot than any other shoe in the world, and this company is the only one in Canada manufacturing and dealing exclusively in what it claims is correct footwear. The lasts on which "Natural Tread" shoes are made are based on the lines of the natural human foot. Yet the boots are stylish and made of the best materials. Their construction has been approved by the War Work Council of the Y. M. C. A., and by hospitals and organizations interested in the health welfare of humanity. The men's shoe here illustrated is recommended by George Cummings, the professional golfer, as an ideal shoe for the links.

Men's "Natural Tread" Oxford.

Women's "Semi-Natural" Boot

Women's "Natural Tread" Boot



View of "Natural Tread" Sole

Wearers of "Natural Tread" and "Semi-Natural Tread" shoes—a modified form combining style and comfort—will not be subjected to the annoyance of ill-fitting rubbers, as the company also manufactures rubbers in black and brown to fit all styles of their shoe.—Natural Tread Shoes, Limited, 310 Yonge street, Toronto, Ontario, Canada.

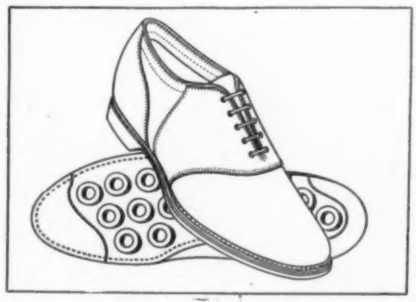
INSTEAD OF AN UMBRELLA

Everyone is familiar with the sight of a newspaper used to protect hats in a sudden shower. They will serve in a pinch, but a more practical and handy article that can be quickly put over a hat in case of rain is the "Stop-A-Drop" hat shield, which, unlike an umbrella, can be carried in pocket or handbag when not needed. It is made of fine quality dark-gray rubberized material fastened with snaps and will fit any hat up to 16 inches in diameter. It is dustproof as well as waterproof and permits the wearing of a stylish, dressy hat in an automobile without danger of dusty or crushed trimming.—Stop-A-Drop Hat Shield Co., Chicago, Illinois.

"Stop-A-Drop" Hat Shield

A GOOD LOOKING GOLF SHOE

Every golfer knows the importance of wearing shoes that will not slip, inside or out, in stance, back swing or finish. Golf shoes must stand tremendous strain in places that in ordinary shoes receive little wear and unless constructed with this fact in view they do not give the service the buyer has a right to expect. A shoe that fills all requirements for strength and service and has the advantage of smartness and comfort is the Tom Logan golf shoe. The style illustrated is made of the best leather with a stout innersole, and rubber and fiber composition outersole with suction cups.—Thomas H. Logan Co., Hudson, Massachusetts.



"Tom Logan" Golf Shoe.

A PUNCTURELESS INNER TUBE

The Hercules "Airless Punctureless" inner tube is made of specially compounded, perforated soft rubber in two halves for convenience in manufacture and inserting into the casing, and is designed to fill the cavity ordinarily occupied by an inflated inner tube. The two halves of the Hercules tube when together give the appearance of a solid core, as the perforations do not extend through the outer wall of the tube. The system of circular openings consists of rows of perforations of varying diameters, so arranged that the solid rubber between the openings acts tangentially to equalize the strain.

"Airless Punctureless" Inner Tube

Wire, nails, tacks, pebbles and glass, the cause of 90 per cent of the punctures and blow-outs in air tubes, are said to have no effect on this tube. The maker also claims a minimum wear on the casing, indicating that any casing reasonably well built of good material will serve indefinitely when equipped with this tube.—Hercules Rubber Corporation, 908 Union Central Building, Cincinnati, Ohio.

"FISHBRAND" APRON

FISHWIFE'S RUBBER APRON

A practical waterproof garment is the "Fishbrand" apron which was originally intended for use of fishwives and market women. Its useful features will be appreciated, however, by all women who have wet, dirty work to do. The apron is made of single rubber sheeting in serviceable black and entirely covers the front of the wearer's dress. It will not wet through and can be cleaned quickly with a damp cloth or sponge. It is a useful article without being very heavy or cumbersome to the wearer.

RUBBER ACID CONTAINER

ACID BUCKET

Acids of necessity require a special container when being carried about in manufacturing processes. Hard rubber is one of the best materials for these containers, as it does not corrode under the action of acid, is practically unbreakable and of little weight. A particularly well-constructed acid bucket is here illustrated. It is made in two styles, one entirely of rubber and the other having double rubber walls reinforced with metal rim at top and bottom, with metal side hooks and rubber handle. The metal-reinforced bucket will probably stand more abuse, but the one of all rubber has no parts to corrode by the action of the acid contents.

Both the "Fishbrand" rubber apron and the acid bucket are manufactured by the same company.—W. H. Salisbury Co., Inc., 308 West Madison street, Chicago, Illinois.

NEW PROTECTIVE GARMENTS

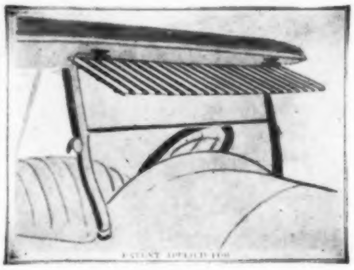
Rubber bloomers have become an indispensable part of the modern infant's layette, "Quickslip" baby bloomers are manufactured especially to fill the need of a cool, sanitary, waterproof garment, easily removed and cleansed, and with no buttons, strings, tapes, or pins. Practically in one piece, of carefully selected all-rubber sheeting in the natural color, they are durable and will stand a great amount of use. The vents at the sides permit air to enter freely, thus preventing over-heating and consequent discomfort. A special feature is the gathered top, cemented without stitching to a strip of rubber.

"QUICKSLIP" BLOOMERS

The same manufacturer puts out a similarly made large model for women, called the "Protecto" sanitary bloomer. More ventilating holes in the sides remove an objection which many women have made to the use of all-rubber bloomers. The "Protecto" is the popular step-in style, full enough for comfort, with no objectionable bulkiness about waist or hips, and comes in three sizes—small, medium and large. This garment is protected by United States patent No. 1,353,750, listed elsewhere in this issue; also by trade mark No. 131,714.—Rubberized Sheeting and Specialty Co., Inc., 221-227 Fourth avenue, New York City.

A SAFETY APPLIANCE FOR YOUR CAR

Many automobile accidents have been traced directly to snow or rain on the windshield or the glaring headlights of an approaching car. Protection against such danger is assured by the maker of the "Budd Motor-Visor," an awning-like contrivance constructed with welded steel frame. Over this is stretched a detachable and cleanable cover of rubber-covered drill which may be had in various color combinations to harmonize with the enamel of the car. The "Budd Motor-Visor" fits all cars, is easily installed and detached, and can be adjusted to any angle.—Alastic Tire Cushion Co., 1421 Locust street, St. Louis, Missouri.

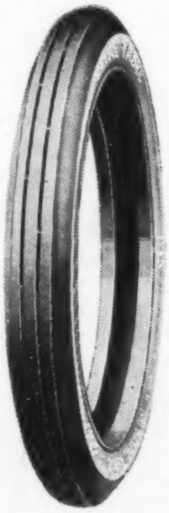


"BUDD MOTOR-VISOR"

SOME TIRES FROM THE MIDDLE WEST

Seven points of superior merit are credited to Wayne Roughshod tires by the maker, who claims to have eliminated rim cuts, tread separation, side wall cracking, bead separation, stone bruises and ply separation, thereby obtaining long life for the tire.

WAYNE "ROUGHSHOD"



WAYNE "RIBBED"

The Wayne ribbed tread is a distinctive design. Wayne casings are all constructed with a heavy wall of resilient anti-friction cushion stock between plies, which is claimed to insure elasticity commensurate with the average service conditions and to maintain a low temperature. The danger of bead separation is overcome by the manufacturers' process of tying the bead firmly where it belongs, turning the plies of fabric over heel and point and protecting the core from all angles. Greatest care has been exercised and every scientific principle used to produce a strictly high-grade long-lived tire which the maker says will exceed the 6,000-mile basis of adjustment.—Fort Wayne Tire & Rubber Manufacturing Co., Fort Wayne, Indiana.

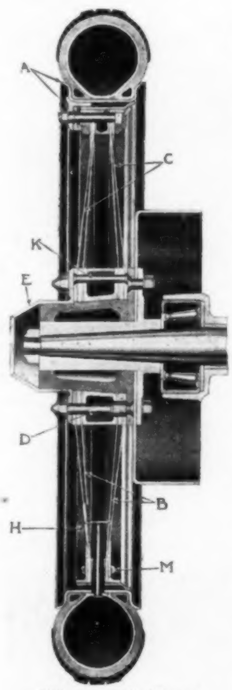
PERFECTLY PACKED TUBES IN THE "EFFICIENT" BOX

The value of an inner tube to the buyer depends largely upon the manner in which it has been packed. An unused tube can be "box worn" to the point of uselessness by careless pack-

ing and boxing. One manufacturer makes a container for inner tubes, the "Efficient" inner tube box, for which it claims especial superiority. The covers are practically dustproof and the heavy quality of stock used, as well as the attractive printing, makes the boxes good-looking and durable.—Gereke-Allen Carton Co., St. Louis, Missouri.

A NEW DISK WHEEL

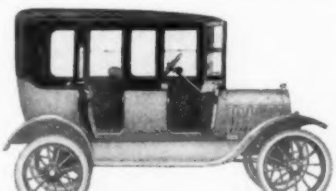
The disk wheel has been characterized as the only wheel ever designed exclusively for motor cars. The "Multidisc" wheel is a detachable wheel with demountable rim in combination and has, the maker claims, many superior advantages over other wheels of the type. A cross-section, shown on this page, may be easily understood by referring to the letters. A, standard demountable rim, making it easy to change tires and eliminating the necessity of carrying an extra wheel; B and C, four inside aluminum disks supporting from four angles, make possible a combination of utmost strength and light weight; D, removing six bolts screwed into driving lugs demounts the wheel; E, specially designed aluminum hub cap adds greatly to appearance of wheel; H, entrance to valve, optional either inside or outside of wheel; K, aluminum tapered hub bearing, making it easy to demount wheel; M, felloe construction of aluminum, held together by thirty ¼-inch bolts; a special hub for each make of car. "Multidisc" wheels impart to any car that air of speed and substantiality which is already expressed in the modern stream-line design, and their beauty is excelled only by their strength and durability.—The Lack Manufacturing Co., Paducah, Kentucky.



"Multidisc" Wheel

A FOUR-SEASON TOP

"How many lives has a Ford?" is the pertinent inquiry of the manufacturer of the "Faultless" top for automobiles. Equipped with this top, a car can be used with comfort in all four seasons, it is claimed. The "Faultless" top is made in styles to fit Ford and Dodge cars and is constructed with steel and hardwood frame, covered with the best quality ⅛-inch "Neverleak" rubber fabric. The top and sides are well padded to give proper shape and a rain trough is provided to prevent water dripping on the sides. This top can be set up without the aid of a mechanic, as complete instructions for installing accompany each top.—The American Auto Top Co., Pittsburgh avenue and Belt Railroad, Delphi, Indiana.


"Faultless" Auto Top

RUBBER INK ROLL IN THE ADDRESSERPRESS

A new system of mechanical addressing is used in the Addresserpress. A stenographer can stencil the address cards on her typewriter without resorting to the expensive embossing machine necessary with many addressing machines. Another practical feature is the ink roll of soft rubber that presses the ink through the address cards, giving equal pressure to each letter. This overcomes the uneven addresses so frequently seen in mechanically addressed matter.—The Elliott Company, 44 Albany street, Cambridge, Mass.

"Columbia" Heel

POPULAR RUBBER HEEL

That rubber heels were never more popular than at the present time is attested by the demand for the "Columbia" heel, a new product of a Massachusetts rubber company. Put upon the market less than six months ago, the maker says that salesmen have been requested not to show samples until equipment to turn the heel out faster can be secured. The Columbia heel is well made of high quality rubber.—Taunton Rubber Co., Taunton, Massachusetts.

TWO "NAUGAHYDE" SPECIALTIES


"Naugahyde" Collar Bag

A feature of articles made of the waterproof material "Naugahyde," having rubber as a base, is their absolute imperviousness to water and their inability to come apart under the roughest usage. They have no sewed or nailed seams, every part being perfectly vulcanized to adjacent parts. The "Naugahyde" collar bag is handy to have when traveling, as it keeps clean collars fresh and in shape. The brief case has all the good points of the more expensive sole leather, besides qualities peculiarly its own that leather does not possess. It is as durable as leather, but much lighter in weight. It is good-looking, capacious, and fitted with lock and key to insure privacy to valuable papers. The "Naugahyde" traveling bag was described in The India Rubber World, April 1, 1918, page 412.—United States Rubber Co., 1790 Broadway, New York.


"Naugahyde" Brief Case

ENGLISH METHOD OF TUBE SPLICING[1]

This method of splicing inner tubes is not only extremely popular in England with all those concerned in tire repairing but is rapidly being taken up by manufacturers as well.

Not only is the lapped joint a constant source of weakness in itself, but whenever a puncture occurs near it the very act of

Fig. 1. Trimming the Ends

putting the repair on the vulcanizer opens the splice and causes further trouble. All this is avoided when a tube is spliced by the present method, which consists in bringing the two ends together and vulcanizing them without lapping. The tube then has an even uniform surface, all parts are equally strong, and the pressure is equally distributed. The tube is in fact endless, because the space between the two ends is filled with vulcanized

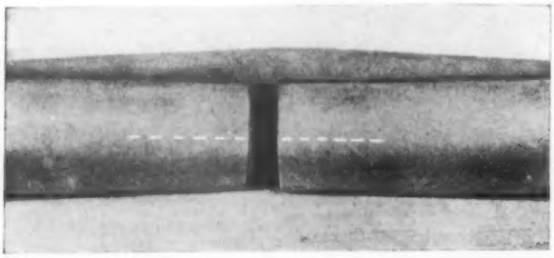


Fig. 2. The Ends Beveled

rubber, which is identical in every way with the tube itself.

The only way in which a butted joint can be made is to vulcanize the tube while it is circular, and as it would be when inflated, and this is done on a special splicer. Following are the instructions for making jointless splices.

Trim both ends of the tube, taking care to press the sides together as shown in Fig. 1. This will preserve the curved shape of the tube.

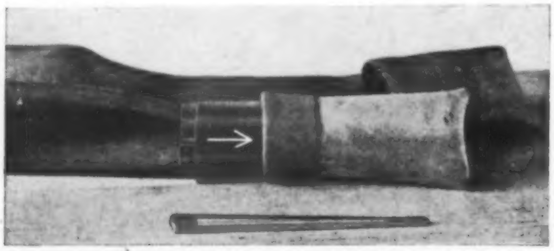


Fig. 3. First End Drawn Over the Expander

Bevel both ends with small shears, giving a good broad bevel, and mark the ends where they should meet. See dotted line in Fig. 2.

Fold back one end of the tube for 12 inches and fold back again for 2 inches, making a double fold as in Fig. 3. Press the tube through the opening at the side of the expanding mandrel, and replace the covering shield. Push the mandrel into the folded part of the tube, as shown by direction of the arrow, until only about ½-inch of the mandrel remains outside. The correct position is shown in the next illustration. The wedge-shaped opening in the mandrel must be the part exposed.

Now bring the other end of the tube over the folded-back portion until the two ends almost meet and form a V-shaped groove between them. Care must be taken that the tube is not twisted. See Fig. 4.

Fit the wedge in the slot and push it until the tube is held tightly on the mandrel. Then rasp the beveled ends. The

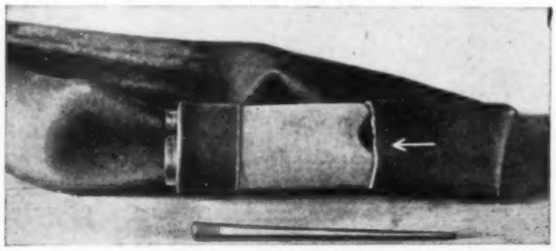


Fig. 4. Other End Ready to Be Pulled on Expander

knife-shaped rasp is best used for this operation, and a piece of old rubber should be placed inside to protect the inner part of the tube. This stage is shown in Fig. 5 and the protecting piece of rubber is marked "X." The rasping is an important operation, and should be done thoroughly and carefully.

Apply two coats of Plastene-Saflux, allowing each coat to dry separately. Then remove the protecting piece of rubber and adjust the two ends of the tube until they are 1/16-inch apart. Fill in the groove with Plastene as follows: cut a narrow strip of this material and lay it evenly at the bottom of the groove

Fig. 5. Rasping the Beveled Ends

all around the splice; then a slightly wider strip on top, and so on until the place is well filled.

The subsequent operations of pressing down, rolling, and trimming are the same as in ordinary tube repairs, but care must be

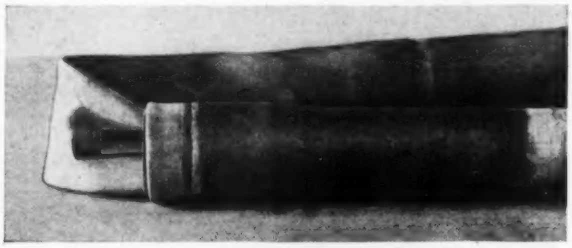


Fig. 6. The Space Filled in with Plastene

taken that the new material is pressed firmly and evenly to the beveled sides, and that the depth of the new rubber corresponds to the thickness of the tube. Apply two coats of red paint, al-

[1] From "The Complete Guide to Tyre Repairing." Harvey Frost & Co., Limited, London, England.

lowing each coat to dry separately, and the splice will then be ready for vulcanizing. Refer to Fig. 6.

Pull out the wedge and wrap a piece of face cloth, slightly damped and chalked, all round the splice. The cloth must be placed evenly in position and have no creases. Remove the key from the splicing mold and pass the tube through the slot as in Fig. 7. Replace the key and fix the tube in the center of the mold. Then put back the wedge and push it in until close contact is secured between the splice and the mold. If it does not fit closely, liners should be used to secure close contact. Fig. 8 shows this stage, and the splicer ready for attaching to the vulcanizing plant.

Let steam into the mold and then open the pet-cocks for a moment to blow out air and condensed steam. Then close the pet-cocks—keeping the main valve open—and time the repair.

FIG. 7. FITTING IN THE MOLD

The pet-cocks should be opened again for a moment after an interval of five minutes.

At the expiration of the correct period the steam valve should be closed, the pet-cocks opened, and the splicer detached from the plant. Remove the mold key, pass the tube through the slot, and then, by pulling out the wedge, the mandrel will be contracted and can be separated from the tube. The repair is then completed.

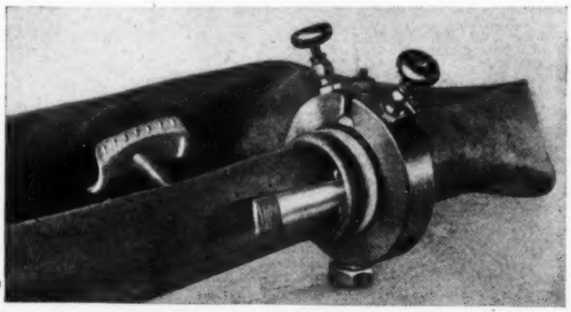


FIG 8. READY FOR ATTACHING TO THE VULCANIZER

AT THE END OF EVERY 2,500 MILES' SERVICE, A TIRE SHOULD BE deflated, dismounted, soapstone and grit removed, and the inside of the casing washed with gasoline. After drying, the inside should be dusted with talc, the tire mounted and the tube charged with fresh air.

During this operation a close inspection should be made of the tread for cuts and fragments of glass, and the rims should be cleaned of rust and painted.—*Miller News Service.*

IMPORTANCE OF RUBBER IN MODERN RAILROAD TRANSPORTATION[1]

AMONG the many uses for india rubber, those that apply to modern railroad transportation are of great importance in the economical welfare of the country. In fact rubber today is nearly as essential to the successful operation of railroad trains as coal to create steam and motive power, the steel rails and the material from which locomotives and coaches themselves are manufactured.

Because of its popular use in the form of tires, we are perhaps accustomed to think of rubber as primarily essential only to motoring. We fully appreciate just how essential rubber is to civilization only when we can see its uses and applications with our own eyes, and perhaps there isn't one in a hundred who appreciates just how essential rubber in its various forms is to the successful operation of a railroad train, nor how many separate functions it performs.

Take the brakes, for instance. In the olden days before all the various possibilities of harnessed steam were known to the engineering world, coaches had to be checked in their speed by individual manipulation of hand-operated brakes on each coach. This prevented the engineer attaining any great speed, for should any emergency arise necessitating the quick stopping of the train, it was impossible to operate all brakes simultaneously, or to stop all coaches without their piling up in a heap. But now, thanks to rubber and air, a train of a dozen passenger and Pullman coaches, or of more than a score of heavily loaded freight cars, can be brought to an easy stop by a lever in the engineer's cab. Thanks also to rubber, it is now possible to convey the exhaust steam and heat from the locomotive boilers, through pipes and radiators in every coach.

Rubber is also responsible for the discard of the old gas-lighted passenger coaches, and their being replaced by the more modern coaches equipped with storage batteries and electric lights.

The matter of safety is a mighty important factor. Modern steam transportation has come to be the world asset that it is, not only because of its celerity in covering great distances and in bridging continents, but because of the comparative immunity from danger that this form of travel affords. And safety in railroad transportation depends preponderately upon rubber. The air brake is comparatively simple in operation, yet without rubber never could have been applied to railroad trains, for two specially constructed, multiple-ply pieces of rubber hose form the connecting link of compressed air pipes and cylinders between coaches. With trains swinging around curves and swaying as they speed along it would be impossible to effect the car union of brakes with metal piping.

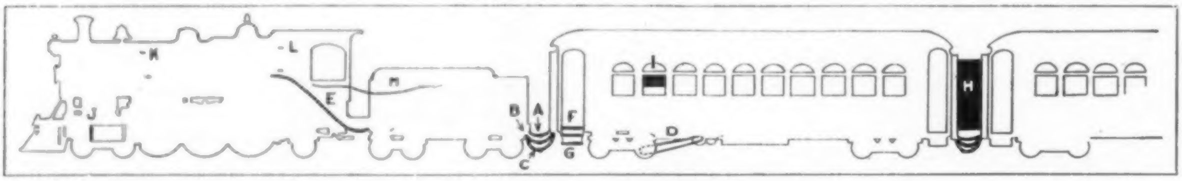
Air signal hose also connects all coaches of a passenger train, enabling the conductor or trainman to signal the engineer from any part of the train. Steam-heat hose lengths also connect passenger coaches with the engine, the exhaust steam and heat from the boilers being forced through the runner connections and through radiators in each coach.

That makes six pieces of hose to every passenger or Pullman coach—two 22-inch lengths of air-brake hose, two 22-inch lengths of air-signal hose, and two 24 or 25-inch lengths of steam-heat hose. Air-brake hose is also a necessary equipment on all freight cars, there being two lengths to every car.

Latest available statistics show approximately 2,500,000 freight cars rolling in the United States, about 60,000 passenger coaches and at least 10,000 Pullman sleeping and parlor cars. That means a total of 2,570,000 cars and coaches, each equipped with two pieces of 22-inch air-brake hose. Thus, the air-brake hose equipment in the United States today consists of 5,140,000

[1]By Ralph C. Busbey, Goodyear News Service.

lengths. Each hose is replaced every six months, making 10,280,000 pieces of air-brake hose necessary every year. Each piece being 22 inches long, this means a total of 226,160,000 inches of air-brake hose or exactly 3,570 miles. In other words, if all the air-brake hose used in the United States in a year's time could be stretched out, with the individual pieces placed end to end, it would reach across the vast American continent, from Portland, Maine, to Portland, Oregon.



Goodyear News Service

Showing Uses of Rubber in Railroad Practice

A—Air-signal hose
B—Steam-heat hose
C—Air-brake hose
D—Generator axle-lighting belt
E—Tender hose
F—Rubber floor treads and tiling
G—Rubber step treads
H—Rubber vestibule curtains
I—Rubber window curtains
J—Cylinder-head packing
K—Air pump packing
L—Gage glass gaskets
M—Squirt hose

On each of the 70,000 passenger and Pullman coaches there are also two lengths of air-signal hose and two lengths of steam-heat hose. Figuring four such lengths to a coach, and replacement of all hose equipment twice a year, it would take approximately 200 miles of such hose to meet the American railroads' needs every year. Added to the 3,570 miles of air-brake hose already computed, we have the amazing total of 3,770 miles of hose used every year—enough to make a solid line hurdling the ocean and reaching from New York to Gibraltar.

The air-brake hose is of uniform size, measuring one and three-eighths inches in diameter. The steam-heat hose is of slightly larger size, ranging from one and three-quarters to one and five-eighths inches in diameter, while the air-signal hose is one and one-eighth inches in diameter. These differences in size are important, for the three pieces of hose hang together from the end of each coach, and the brakeman making train connections can detect each hose instantly by its size and special branding, and can effect the coupling without confusion.

Modern passenger coaches are equipped with electric lights and large storage batteries in which hard rubber is largely used. These are recharged by means of a dynamo beneath the car body, the dynamo being operated and electricity generated by means of a rubberized fabric belt connected with the axle of one truck. Thus with the train speeding along at 60 miles an hour, the generator axle-lighting belt keeps the batteries well charged. A four-ply belt is used, six inches wide and 10 feet long. The average life of a belt is 25,000 miles, but in winter with trains encountering ice and snow, coaches in swinging around curves frequently throw the belts and lose them. This means a heavy replacement of belts every year. But figuring one ten-foot belt to every one of 70,000 coaches, it takes 700,000 feet of such belt, or 135 miles, for original equipment. To figure the total amount of belting including replacements would be practically impossible.

Every locomotive must have two lengths of tender hose connecting with the tender, to syphon water into the boilers. This hose varies in size from a diameter of two and one-half inches to three and one-half inches, and varies in length from 36 to 72 inches. Each locomotive also has what is known as a squirt hose, connecting the engine-man's cab and the tender.

On locomotives, also, rubber packing of special make is used for cylinder-head packing and air-pump packing, while the gage-glass gaskets in the engine-man's cab are of rubber. Going back through the train we find rubber floor treads and step treads used on the steps and in the vestibules of coaches, with rubber tiling used in many passenger coaches and Pullmans as flooring material. To compute the square foot area of rubber tiling floor and step treading and rubberized curtain material used on railroad trains in America would mount into figures seemingly inconceivable.

And back behind the scenes of railroad transportation we find numerous other uses for rubber. In the round-house, for instance, we find "blow-off" hose used to remove water and steam from engine boilers. Then there is a specially designed "wash-out hose" equipment for cleaning boilers, also "fill-up" hose, engine-washing hose, steam and water hose and pneumatic tool hose, all used every day in the year in hundreds of round-houses.

All these various type of hose are manufactured according to master car-builders' specifications. Needless to say, the best of materials and the best of workmanship available are necessary to the successful manufacture of such rubber equipment for the railroads, for the safety and comfort of railroad travel today depend very largely upon rubber.

RUBBER IN THE MANUFACTURE OF DYNAMITE

More high explosives are used in pursuing the arts of peace than in times of war. The modern farmer would scarcely know how to get along without them. They do the work of the hired man who used to toil patiently rooting out stumps, digging ditches and drains and holes for posts and for young orchard trees.

Hercules Powder Co.

Rubber-Lined Gutters Convey Nitroglycerine to the Storehouse

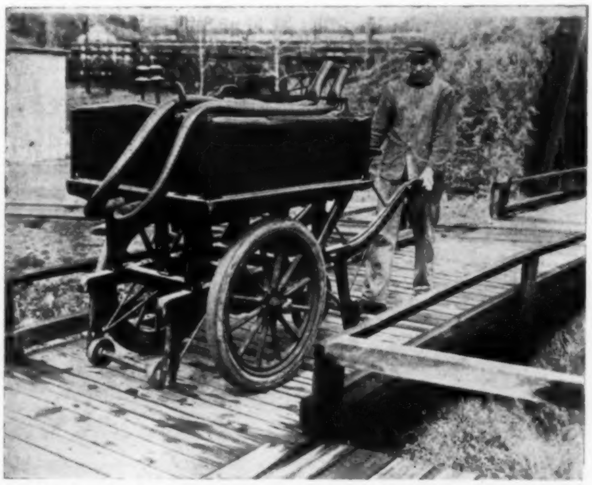
Dynamite does all these things for the farmer nowadays—what would he do without its willing power in these times of high-priced farm labor? It never strikes, never takes holidays, and never objects to working overtime. And even the poorest farmer

can avail himself of its aid because of its low cost. India rubber has much to do with that, although this fact is seldom realized. The use of rubber in the manufacture of high explosives has lessened the attendant dangers to the point where their manufacture is no more costly than that of commodities with no potentialities of destruction. Personal danger has been reduced to a minimum and the lives of the workmen guarded by the use of india rubber. Not an explosive itself, and not even a component ingredient of one, it is safe to say that without the assistance of rubber no explosive could be manufactured.

Dynamite was invented in 1866 by Nobel, a Swedish engineer, and has proven men's greatest ally in his fight to conquer the earth. It wages ceaseless warfare against the forces of Nature, blasting out channels for commerce and transportation, breaking down natural barriers that check commercial intercourse, laying bare hidden stores of precious metals, minerals and oil, and reclaiming for agricultural use desert and swamp land alike.

Many persons who habitually employ dynamite in their daily activities are but hazily aware of its content and totally uninformed as to the processes of its manufacture. They know that nitroglycerine, which it contains, is very dangerous to handle but that dynamite is comparatively safe. Nobel's process was to incorporate nitroglycerine with a kind of infusorial earth. Modern practise has substituted active absorbents containing nitrates of soda, nitrate of ammonia, wood pulp, etc., which assist in the explosion instead of being absorbents only.

Nitroglycerine is made by adding slowly a comparatively pure glycerine to a mixture of nitric and sulphuric acids in a steel tank with a brine coil around its outer edge to remove the heat generated. This is called a nitrator, and the contents are slowly agitated by means of mechanically driven paddles. After all the glycerine is added the mixture is let into a lead tank and allowed to stand until the nitroglycerine rises to the top. This is drawn off to a tank of warm water where it is washed free from acid, afterwards receiving a final wash with soda ash solution to remove the last trace of acid. During all these operations the

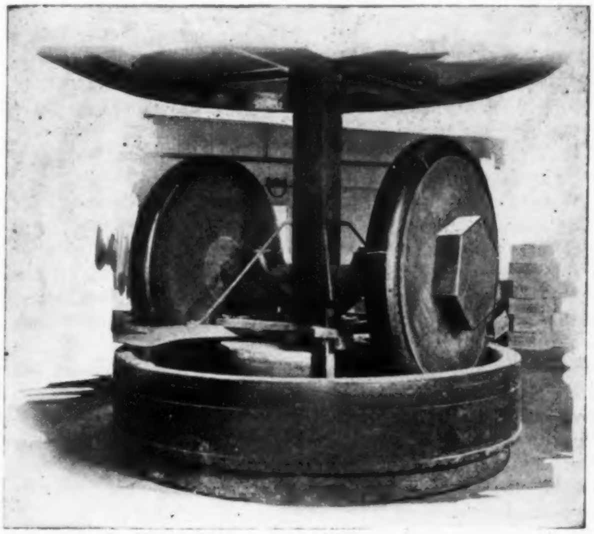


Hercules Powder Co.

RUBBER-TIRED BUGGIES CONVEY NITROGLYCERINE FROM STOREHOUSE TO MIXER

hands and feet of the workmen are protected from acid burns and toxic absorptions by rubber gloves and boots, and rubber hose is used extensively. The pure nitroglycerine is then conveyed to the storehouses in gutters which are lined with rubber to facilitate gentle handling.

The absorbent material, technically known as dope, is prepared by every manufacturer of explosives according to formulas worked out by his chemists. It is taken to the mixing house in fiber barrels, and the greatest care is required in handling nitroglycerine on its way to the mixing house. The nitroglycerine wheeler uses a copper-lined, rubber-tired buggy for his precious charge. He owes not only his own safety but that of the entire plant to the resilient qualities of india rubber. No one disputes his right of way. A smooth plank walk is constructed especially



Hercules Powder Co.

THE HEAVY WHEELS OF THE MIXER ARE SHOD WITH HARD RUBBER

for his use. At one end he fills the buggy from the storehouse. At the other end he transfers the nitroglycerine to the mixing machine by means of long rubber tubes attached to the buggy.

The mixing machine is a wooden bowl in which large wooden wheels revolve. Here again rubber safeguards the workmen, for the wheels are shod with hard rubber, thus allowing no metal in contact with the dynamite during the mixing process. Even the pulleys that drive the mill are made of wood, lest a bit of rubbing metal produce a disastrous spark. Five minutes' mixing by the rubber-tired wheels is sufficient. The loose dynamite is removed by wooden shovels into wooden tubs, thence to the packing machine, where it is packed into paraffined paper shells by means of wooden tamps tipped with rubber, a great improvement over the dangerous old-time hand operation of filling each shell through a funnel.

The dynamite cartridges are placed in paraffine-paper lined boxes containing a small amount of sawdust to lessen shocks and the covers nailed on. This is the final step in the manufacture of the explosive, which is then stored in an isolated magazine until shipped.

Gelatine dynamite was invented to fill the demand for an explosive that would resist the action of water. It is a jelly-like substance and is produced by the addition of small amounts of nitro cotton to the mixture of nitroglycerine and absorbents. Rubber contributes to safety in gelatine dynamite manufacture in the same manner as in making ordinary dynamite. Rubber gloves, boots and aprons are worn by the workmen and rubber hose and tubing are largely used.

THE EXTENT TO WHICH TIRES ARE USED WEST OF THE ROCKIES IS fairly reflected in the registration of automobiles in eleven Western States for the year 1920 up to July 1. The figures show that California had 421,327, Washington 143,561, Colorado 111,907, Oregon 89,933, Montana 52,100, Idaho 46,360, Utah 37,261, Arizona 29,803, Wyoming 21,250, New Mexico 20,300, Nevada 9,383.

Activities of The Rubber Association of America

DIVISION COMMITTEE MEETINGS

A MEETING of the Executive Committee of the Mechanical Rubber Goods Manufacturers' Division was held in New York City on October 19, at which trade conditions in general were discussed.

The Specification Committee of the Mechanical Rubber Goods Manufacturers' Division met in the Association rooms on October 26, when a conference was held with a committee appointed by the American Railroad Association to confer on subjects of mutual interest to both railroads and manufacturers in connection with specifications for the mechanical rubber goods which are used by the carriers.

A most interesting meeting of the Executive Committee of the Tire Manufacturers' Division was held in the Association rooms October 20, when many matters of importance to the tire industry were given consideration. Among the most important of the conclusions reached was the decision to have the Association gather statistics on a monthly basis from members of the Division with respect to the inventory, production and shipments of automobile tires and tubes and the consumption of crude rubber and fabric in that production. Consideration was also given to the proposed organization of a foreign trade department as an adjunct to the Association and to the work which might be done by that department on subjects of interest to tire manufacturers, notably the promotion of the straight side tire equipment in foreign markets.

It was arranged also to appoint a sub-committee of the Tire Manufacturers' Division comprised of advertising or publicity representatives of several members to give attention to matters of an advertising or publicity nature for the Association. It was also recommended that a special committee of the Division be established comprised entirely of those manufacturers engaged in making bicycle tires, in order that due consideration might be given to the problems which are of particular interest to those manufacturers.

THE INQUIRY REGARDING PRICE GUARANTY

Members will recall that in 1919 the Federal Trade Commission initiated investigation proceedings for the purpose of securing definite information regarding the practice of protecting customers against decline in manufacturers' prices. The Commission, therefore, invited all of the important industries in the country to inform it of the manner in which they applied this practice, if at all, and the particular reasons and conditions which made the practice desirable or undesirable from the standpoint of the manufacturer, wholesaler, dealer and consumer.

The two divisions of this Association which are most vitally interested in this practice are the Footwear Division and the Tire Manufacturers' Division, although the practice extends to other specific articles manufactured by the members, namely, clothing, garden hose and possibly one or two others.

A large majority of the members of the Footwear and Tire Divisions responded to the questionnaires submitted to them and a compilation of the facts and views of the members regarding continuance of the present practice was prepared. This was presented to the Federal Trade Commission August 27, with request for permission to appear at the Trade Practice Submittal held October 5.

A joint sub-committee representing both the Tire Manufacturers' and Footwear Divisions attended this meeting, which occupied all of October 5 and 6. The first day of the hearing was taken up almost entirely with arguments from those opposed to the practice of protecting customers against decline in prices. Most of the industries represented by those speaking against the practice do not employ it now and their arguments as to unfairness were based largely upon what would occur if the practice were introduced into those industries. No facts were shown indicating that any unfairness had actually resulted from the use of this practice.

During the second day of the hearing representatives of this Association explained to the Commission the very seasonal nature of the footwear business and the tire business and set forth the various reasons why this practice of protecting against price decline should be continued. With relation to tires the practice may be divided into two classes, first, the protection as applied to spring dating business and, second, protection as applied to current business. The answers to the questionnaire submitted to the members of the Tire Manufacturers' Division showed that an overwhelming majority of the members favored the continuance of this practice with relation to spring dating business.

At the conclusion of the hearing the chairman stated that the Commission had not yet decided what procedure it would follow, but intimated that it might possibly issue some statement with regard to this practice after a full examination of the information which it had gathered, or it might use this information merely as a guide in the case of any specific complaints which might hereafter be considered by it in relation to this practice.

It is the opinion of counsel for the Association that unless and until the Federal Trade Commission issues a definite order directing manufacturers of rubber goods to cease the practice of protecting their customers against price decline such manufacturers will be warranted in continuing this practice, if they so desire.

STATISTICS COMPILED FROM QUESTIONNAIRES NOS. 101 AND 102, COVERING THE YEAR 1919

Number of firms to whom questionnaires were sent.....	283
Number of firms responding..........................	167
Number of firms reporting statistics..................	160

AVERAGE TOTAL DAILY NUMBER OF EMPLOYES, 177,333

	Reported by Manufacturers Who Also Reclaim	Reported by Reclaimers Solely	Total	Approximate Amount Scrap Used per Pound of Reclaimed Produced
Reclaimed rubber produced from raw and cured scrap ....*pounds*	62,010,311	107,494,619	169,504,930	1 lb., 5 oz.
Scrap rubber (including raw and cured scrap) consumed in production of reclaimed rubber.*pounds*	79,107,432	151,877,814	230,985,246	

NUMBER OF POUNDS OF CRUDE RUBBER CONSUMED IN THE MANUFACTURE OF RUBBER PRODUCTS AND TOTAL SALES VALUE OF SHIPMENTS OF MANUFACTURED RUBBER PRODUCTS

Product	Number of Pounds Crude Rubber Consumed	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and tire sundries:		
Automobile and motor truck casings.....	240,904,417	$194,454,021
Automobile and motor truck tubes......	54,025,307	39,550,163
Solid tires	27,989,361	13,111,246
Other tires and tire sundries...........	14,472,416	13,606,740
*Total—Tires and tire sundries......	338,521,064	$674,249,726
Other rubber products:		
Mechanical goods	23,819,144	77,487,032
Boots and shoes......................	29,042,262	76,539,565
Other products	14,646,895	59,382,707
*Total—Other rubber products........	67,712,158	$291,835,550
Grand total—All products............	406,231,563	$966,085,276

*NOTE—It should be noted that the above totals of "Tires and tire sundries" and "Other rubber products" include some figures which are not shown under the various items, which is due to the fact that some of the reports received were not itemized.

News of the American Rubber Industry

DIVIDENDS

The American Chicle Co., New York City, has declared a dividend of $1 per share, payable November 1 on its non-par value common stock of record October 20, 1920.

The American Wringer Co., Woonsocket, Rhode Island, recently declared its quarterly dividend of $1.75 per share, payable October 15 on preferred stock of record September 30, 1920.

The American Zinc, Lead & Smelting Co., New York City and St. Louis, Missouri, has declared its regular quarterly dividend of $1.50 per share, payable November 1 on its preferred stock of record October 15, 1920.

The Dayton Rubber Manufacturing Co., Dayton, Ohio, recently declared its 26th consecutive dividend of seven per cent, payable October 1, 1920.

The Firestone Tire & Rubber Co., Akron, Ohio, recently declared a quarterly dividend of one and one-half per cent, payable October 15 on its six per cent preferred stock of record October 1, 1920.

The General Tire & Rubber Co., Akron, Ohio, recently declared its regular quarterly dividend of one and three-quarters per cent, payable October 1 on preferred stock of record September 20; it has also declared a dividend of four per cent, payable November 1 on common stock of record October 20, 1920.

The Hodgman Rubber Co., Tuckahoe, New York, has declared its quarterly dividend of two per cent, payable November 1 on preferred stock of record October 15, 1920.

The Kelly-Springfield Tire Co., New York City, has declared the following dividends: quarterly, $1 per share, and a three per cent stock dividend, both payable November 1 on common stock of record November 15; quarterly, $2 per share, payable November 15 on eight per cent preferred stock of record November 1, 1920.

The Lee Rubber & Tire Corporation, Conshohocken, Pennsylvania, has declared a quarterly dividend of fifty cents per share, payable December 1 on capital stock of record November 15, 1920.

The Manufactured Rubber Co., Philadelphia, Pennsylvania, recently declared its quarterly dividend of one and one-half per cent, payable October 14 on preferred stock of record October 9, 1920.

The O'Bannon Corporation, New York City, recently declared its regular semi-annual dividend of three and one-half per cent, payable October 1 on preferred stock of record September 25, 1920.

The Sterling Tire Corporation, Rutherford, New Jersey, recently declared the following dividends: one per cent, quarterly, on common stock; one and three-quarters per cent, quarterly, on seven per cent preferred stock; and two per cent, quarterly, on Series B preferred stock; all payable October 20 on stock of record September 30, 1920.

The Tyer Rubber Co., Andover, Massachusetts, paid its regular quarterly dividend of $1.50 per share on common stock, October 15, 1920.

The United States Rubber Co., New York City, recently declared quarterly dividends of two per cent, payable October 15 on both common and first preferred stock of record October 30, 1920.

The Van der Linde Rubber Co., Limited, Toronto, Ontario, has declared its regular semi-annual dividend of seven per cent.

The Wellman-Seaver-Morgan Co., Akron, Ohio, recently declared its fifty-ninth quarterly dividend of one and three-quarters per cent on preferred stock. On account of contracts for car dumpers, floating cranes, and rubber machinery, totaling about $1,500,000 and requiring considerable capital, the usual cash dividend on common stock was deferred and instead a ten per cent dividend to be charged to accumulated surplus was voted, payable October 15 to stock of record September 28, 1920.

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania, recently declared quarterly dividends of two per cent ($1 per share), payable October 15 on preferred stock and October 30 on common stock; both on stock of record September 30, 1920.

FINANCIAL NOTES

Colonel Samuel P. Colt, chairman of the board of directors of the United States Rubber Co., denies the reports that his company will require new financing before January 1. He calls attention to the fact that the business of the United States Rubber Co. is well balanced between footwear, tires and mechanical goods, the former being its largest product, and tires being about one-third of its total production. He stated that there had been no falling off in the volume of the company's sales taken as a whole.

A $500,000 issue of 7 per cent cumulative preferred stock has recently been announced by the Converse Rubber Shoe Co., Malden, Massachusetts. This is the first block to be sold from the last authorized increase of $2,000,000 in the company's capitalization.

The Falls Rubber Co., Cuyahoga Falls, Ohio, increased its authorized capital stock $1,500,000 on October 1, giving the company an authorized capital of $2,500,000, all common stock.

The following is the statement of Boston Woven Hose & Rubber Co., Boston, Massachusetts, as of September 1, 1920.

Assets

Patents			$1.00
Office furniture			1.00
Land and buildings	$2,352,053.46		
Less depreciation	816,457.90		
		$1,535,595.56	
Machinery and tools	$2,325,961.74		
Less depreciation	1,256,940.37		
		1,069,021.37	
Cafeteria fixtures		5,055.76	
			2,609,672.69
Cash		$465,215.18	
Accounts receivable		1,791,264.77	
Notes receivable		16,392.00	
Merchandise inventory		4,926,299.26	
			7,199,171.21
Notes receivable—Employees' stock subscriptions			234,066.41
Liberty Bonds			405,436.00
			$10,448,348.31

Liabilities

Capital stock, preferred	$750,000.00	
Capital stock, common	4,200,000.00	
		$4,950,000.00
Loans, bills payable	$2,455,000.00	
Loans, Liberty Bonds	325,000.00	
Accounts payable	515,116.24	
Accrued wages	41,235.96	
		3,336,352.20
Surplus		2,161,996.11
		$10,448,348.31

A group of New York and Chicago bankers has advanced a substantial sum to The Goodyear Tire & Rubber Co. and further amounts will be provided as required. Goodyear business continues on an even keel, showing sales for the first 26 days of September in excess of $14,000,000. With the fiscal year ending October 31 sales to date exceed $195,000,000, and will thus go far above $200,000,000 for the year, as compared with slightly over $167,000,000 last year.

It is reported that The Perfection Tire & Rubber Co. will issue $1,000,000 8 per cent gold notes for one year to be dated October

1, 1920, secured by a trust deed on the company's plant at Fort Madison, Iowa, the funds to be used for expansion purposes.

The Republic Rubber Corporation has reduced its indebtedness about $4,000,000 in the past three months. On September 30 the indebtedness was $2,600,000 compared with $6,443,991 as of June 30. Inventory on hand and in transit shows about $5,000,000 as against $8,972,456 on June 30.

The National Aniline & Chemical Co., Inc., New York City, has increased the common shares of its stock to 554,386 and the capital to $26,296,630.

NEW YORK STOCK EXCHANGE QUOTATIONS

October 23, 1920

	High	Low	Last
Ajax Rubber Co., Inc	41	40¾	40¾
The Fisk Rubber Co	20¾	20⅛	20½
The B. F. Goodrich Co	50⅜	48¼	50
The B. F. Goodrich Co., pfd	84	81	82¾
Kelly-Springfield Tire Co	53½	51⅜	52½
Kelly-Springfield Tire Co., pfd	91½	91½	91½
Keystone T. & R. Co., Inc	15½	14¼	14½
Lee R. & T. Corp	20⅜	20⅜	20⅜
United States Rubber Co	77¾	75½	77⅜
United States Rubber Co., pfd	106¼	105	106¼

CLEVELAND STOCK EXCHANGE QUOTATIONS

The following quotations on the Cleveland Stock Exchange, October 19, of stock of the principal rubber companies were supplied by Otis & Co., Cuyahoga Building, Cleveland, Ohio:

	Last Sale	Bid	Asked
Firestone T. & R. Co	106	105	...
Firestone T. & R. Co., 1st pfd	88½	88½	90
Firestone T. & R. Co., 2d pfd	83½	...	...
General T. & R. Co., pfd	102	...	102½
The B. F. Goodrich Co	52¼	...	...
The B. F. Goodrich Co., pfd	84¾	...	85¼
The Goodyear T. & R. Co	70	65¼	67½
The Goodyear T. & R. Co., 1st pfd	77⅛	75	77
Kelly-Springfield T. & R. Co	156⅛	...	...
Kelly-Springfield T. & R. Co., pfd	120	...	...
The Miller Rubber Co	115	...	112
Portage Rubber Co.	45	...	50
Portage Rubber Co., pfd	60	62½	67
Star Rubber Co	350¾	...	...
Swinehart T. & R. Co	80	...	...
Victor Rubber Co	22	...	24

NEW INCORPORATIONS

American Insulator Corp., The, September 17 (Massachusetts), $1,000,000. E. L. Clarke, 3 Wilshire street; V. M. Kempton, Marshall street, both of Winthrop; G. C. Cutler, Jr., Heath street, Brookline—both in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in plastic and other materials for insulation, heat resisting and other purposes.

Apex Tire & Rubber Co., October 15 (Delaware), $1,000,000. M. E. F. Hawkins; W. L. Jourdan; E. E. Borton—all of Wilmington, Delaware. To manufacture tires.

Armstrong Tire & Supply Co., September 20 (Delaware), $225,000. F. R. Hansell; J. V. Pimm; E. M. MacFarland—all of Philadelphia, Pennsylvania.

Brix Rubber Cement Co., Inc., September 23 (New York), $10,000. L. Knapp, 33 Jackson avenue; T. Brix, 2349 Second avenue; M. Streeve, 153 Ninth street—all of Long Island City, New York. To manufacture rubber cement, tires, etc.

Brock Co., The, September 22 (Massachusetts), $40,000. F. M. Hanson, Saugus; L. M. Marsh, Roslindale; A. M. Monahan, Boston—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in rubber goods.

Chalfin & Co., Inc., Joseph, September 25 (New York), $1,500. J. and F. Chalfin, both of 795 Crotona Park North, Bronx; I. Bromberg, 396 Christopher avenue, Brooklyn—both in New York. To do a general rubber business.

Crescent Tire & Rubber Co., September 28 (Delaware), $100,000. M. L. Rogers; M. M. Nicholson; W. G. Singer—all of Wilmington, Delaware.

Dun-Pen Co., October 18 (Delaware), $21,000,000. T. L. Croteau; M. A. Bruce; S. E. Dill—all of Wilmington, Delaware. To manufacture fountain or stylographic pens.

Ewing Rubber Co., September 29 (New Jersey), $100,000. A. F. Updike; J. Schultz; A. Emrick—all of Trenton, New Jersey. Principal office, Homan and Hilton avenues, Hillcrest, New Jersey. Agent in charge, E. F. Updike. To manufacture, buy, sell and deal in all kinds of rubber goods.

General Tire Sales Co., October 6 (Delaware), $550,000. M. L. Rogers; M. M. Nichols; W. G. Singer—all of Wilmington, Delaware. To deal in automobiles and automobile tires.

Gove & Co., Inc., September 21 (New York), $24,000. F. G. Gove, Jr.; W. Liddle, Jr.; F. L. Byrne—25 Beaver street, New York City. To deal in crude rubber.

Greenpoint Rubber & Metal Corp., September 24 (New York), $10,000. M. Fishman, 18 Franklin street, Brooklyn; P. Fogelman; H. Blum, both of 299 Broadway, New York City—both in New York. Principal office, Brooklyn, New York. To do a rubber and metal business.

Henba Balloon Developing & Transport Co., October 18 (New York), $50,000. J. Henba; G. Frey; R. Hyde—all of 9,201 Fort Hamilton avenue, Brooklyn, New York. Principal office, Brooklyn, New York. To make airplanes, etc.

Joburn Rubber Corp., September 29 (New York), $5,000. H. Joseph; A. M. Burnham; E. Levy—all of 1 Madison avenue, New York City. To manufacture rubber.

Le-Rex Products Co., The, September 22 (Massachusetts), $25,000. J. S. Herrick, 164 Strathmore Road, Brighton; S. Olansky; 3 Westminster Road, Roxbury; M. H. Webb, 1340 Commonwealth avenue, Allston—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and sell druggists' sundries, etc.

Liberty Rubber & Supply Corp., October 13 (Delaware), $100,000. E. E. and F. C. Jeffords, both of Erie, Pennsylvania; C. C. Densford, Buffalo, New York. To deal in tires.

Lincoln Shoe & Rubber Co., September 16 (Massachusetts), $50,000. J. L. Wiseman, 21 Homestead street; E. Adlow, 35 Elm Hill Park, both of Roxbury; G. L. Kotzen, 86 Orange street, Chelsea—both in Massachusetts. Principal office, Boston, Massachusetts. To buy, sell and deal in shoes, rubbers, etc.

Littell-Coombs Co., Inc., September 28 (New York), $5,000. M. C. Coombs, 607 East 29th street; F. G. and I. H. Littell, both of 32 Chester Court—both in Brooklyn, New York. Principal office, Brooklyn, New York. To manufacture rubber goods.

Mathey Brothers, Inc., September 23 (New York), $15,000. F. A. Mathey, president, 506 West 45th street; J. H. Jackson; M. M. Coughlin, both of 27 William street—both in New York City. Principal office, 506 West 45th street, New York City. To sell truck tires.

National Gasoline Hose Co., Inc., October 5 (New York), $1,000. I. E. Maginn; J. R. Cogen; W. P. Cavanagh—all of 1476 Broadway, New York City. To manufacture hose.

Standard Wire Tire Corp., September 25 (New York), $100,000. B. J. Bowers, 159 Herkimer street; S. S. Shears, 221 Hancock street, both in Brooklyn; A. L. Chauvet, 51 Hamilton Place, New York City—both in New York. To manufacture tires, etc.

Starbestos Textile Co., September 28 (Massachusetts), $100,000. T. J. G. Armstrong, 37 Partridge avenue, Somerville; M. F. Ford, 47 Water street, Hyde Park; G. M. Faulkner, 1870 Commonwealth avenue, Brighton—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in asbestos yarns, brake linings and any and all textiles containing asbestos.

Thomas Tire & Rubber Co., The, September 14 (Ohio), $100,000. W. S. Thomas, president; G. B. Thomas, vice-president and sales manager; T. Richards, treasurer; M. S. Lower, general manager; L. H. Jones, secretary. Principal office, Millersburg, Ohio. To manufacture pneumatic automobile tires.

Thrift Garter Co., October 4 (New York), $20,000. C. Cohen; M. L. Blumberg; H. Miller—all of 546 West 146th street, New York City.

Tireheal Manufacturing Co., Inc., October 6 (New York), $150,000. R. H. Raphael; J. Leiman; S. Schnaps—all of 2 Rector street, New York City. To repair tires.

Tompkins Rubber Manufacturing Co., October 16 (Delaware), $300,000. E. E. Tompkins, Narberth; J. M. Stitzer; T. E. Montgomery, both of Philadelphia—both in Pennsylvania.

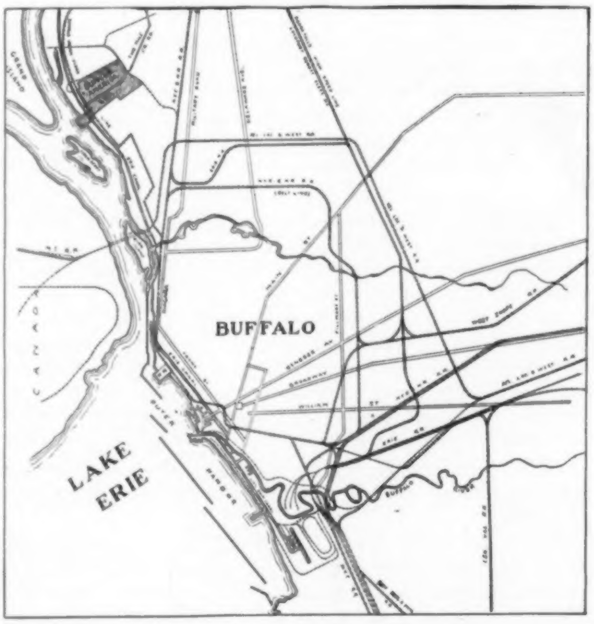
Union County Tire & Rubber Co., October 1 (New Jersey), $100,000. J. A. Kelly, 17 Nutman Place, West Orange; D. Seaman, 798 Hunterdon street, Newark, both in New Jersey; J. Berkelhamer, 34 Lander street, Newburgh, New York. Principal office, 2 South Broad street, Elizabeth, New Jersey. Agent in charge, A. G. Weinberg. To buy, sell, import, export, trade and generally deal in tires and all rubber articles.

United Process Co., Inc., September 24 (New York), $10,000. I. Goldfarb, 134 West 26th street; D. W. and R. Goldfarb, both of 953 Simpson street, Bronx—both in New York City. To manufacture raincoats.

United Tire Stores of Buffalo, September 25 (Delaware), $250,000. W. A. McCoy, Pittsburgh, Pennsylvania; W. I. N. Lofland and F. M. Jackson, both of Dover, Delaware.

WHY DUNLOP WENT TO BUFFALO

Considerable speculation has been aroused as to why the plant of the Dunlop Tire & Rubber Corporation of America was located at Buffalo. The accompanying map will give a more exact idea of just where the Dunlop factory is and also illustrates some of the reasons why it is there. Two facts are quite evident from



The Dunlop Corporation Has Purchased Land Extending to the Niagara River That Provides an Abundant Supply of Water and Affords a Convenient Location for Docking Facilities

this map, one being the large number of railways entering the city, and the other that the Dunlop plant is not only on one of the main rail routes but also on what is destined to be a great water highway as well.

There are some fourteen lines of railroads operating into Buffalo and half the population of the United States lives within a circle whose center is Buffalo and whose radius is one night's journey by rail. Buffalo is within easy access of power, fuel, and markets, including New York City, our greatest port of entry and the largest rubber importing port as well. Therefore, after the analysis of a broad survey the company decided that out of twenty different possible locations Buffalo had more points of advantage for an automobile tire manufacturer than any other city.

The factory is situated in the town of Tonawanda, one mile north of the Buffalo city limits on River road, which runs parallel with Niagara River, being separated from it by the Erie canal and a strip of foreshore. The company has acquired land fronting on the river, which will give access to wharves, so that advantage can be taken of any new developments in water transportation. Plans are in prospect which may ultimately make all of our Great Lakes cities ports of entrance and exit for ocean-borne commerce, and there is the practical certainty of water transportation to Chicago, Detroit, Cleveland, and New York, which are all great tire distributing points.

In view of the large amount of power required in a rubber works, it is a point of importance that in Buffalo there are two ample sources of power supply, both of which are turned into the same mains. Manufacturers have available the supply from the great Niagara Falls plant, as well as the new plant of the Buffalo General Electric Co., which was built during the war as a war measure and is now proving to be quite as valuable in peace times.

PERSONAL MENTION

V. G. Thomas, treasurer of L. H. Butcher Co., New York City, importer and exporter of minerals, colors, and chemicals for the rubber and allied trades, has been elected to membership in The Merchants' Association.

E. W. Newell, engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania, and Harry Young Stebbins, engineer for The Goodyear Tire & Rubber Co., Detroit, Michigan, at Warsaw, Poland, have been elected junior and foreign members, respectively, of the Society of Automotive Engineers.

James H. Aldred, for a number of years assistant chief chemist for the Firestone Tire & Rubber Co., Akron, Ohio, has been appointed chemist for the Smith Rubber & Tire Co., Inc., Passaic, New Jersey.

J. J. Williams has been appointed general production superintendent of The Federal Rubber Co., Cudahy, Wisconsin, effective September 1, 1920.

CANCELLATION OF ORDERS DENOUNCED

A country-wide appeal by an executive committee of The National Association of Credit Men urges a return to solid business principles of good sense and honesty in the sale of commodities. The cancellation of orders is denounced as a contributing cause to business paralysis, responsible for failures of many industrial plants, and the return of merchandise is also held an unnecessary waste and one of the abuses that provoke disorders in business.

The committee suggests that the buyer should not be urged to purchase beyond his needs, but should be sold in good faith and buy in good faith. As the committee sizes up the situation, it is time that the entire business community should be controlled by a strong business conscience which will not under any circumstances allow actions which violate business decency.

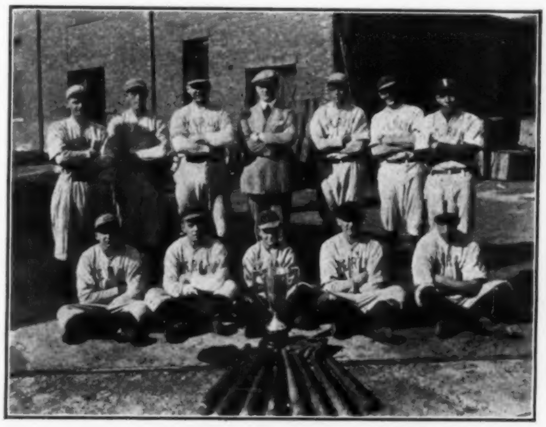
STERLING AGAIN WINS R. I. A. L. PENNANT

Ever since THE INDIA RUBBER WORLD donated a silver cup to the Rubber Industries Athletic League we have watched with friendly interest the contests of the baseball clubs for the permanent possession of the trophy. At the close of the season it was announced that the team of the Sterling Tire Corporation of Rutherford, New Jersey, has for the second consecutive year won the pennant in the Rubber Industries Athletic League. The standing of the clubs at the end of the season of 1920 was:

	Games Won	Games Lost
Sterling	14	2
United States	11	4
Ajax	6	7
Goodyear	2	12
Keystone	2	6
Kelly-Springfield	1	3

This second victory was especially unusual since the Sterling Tire Corporation is probably the smallest of the organizations represented in the league and, unlike some of the others, is composed entirely of amateurs recruited from the factory. None of them had played much more than the normal "open lot" games, although their pitcher, Harvey Davis, has been showing professional class in winning 34 out of 40 games played during the Rubber Industries Athletic League's two years of existence.

One somewhat interesting incident in connection with the second victory was the fact that one of the Sterling 1919 players, to whose work the victory of that year was in some degree attributed, in 1920 became a member of another club in the league Contrary to expectation, this change did not visibly affect the work of the Sterling team.



STERLING BASE BALL TEAM AND THE INDIA RUBBER WORLD TROPHY CUP

THE INDIA RUBBER WORLD trophy must be won three times. Manager Rourke of the Sterling team announces that his organization will be after the third leg on the cup next season.

Batting and fielding averages of the champions were as follows:

Players	Position	Games	Batting Average	Fielding Average
J. Rourke	1st B.	14	413	955
T. Calandriello	S. S.	14	333	918
A. Roache	C.	14	311	984
W. Jackson	L. F.	14	310	900
C. Hess	3d B.	14	283	804
P. Dittrich	C. F.	13	265	1000
W. White	R. F.	14	237	818
H. Davis	P.	13	205	967
T. Brameld	2d B.	13	205	921
A. Jackson	O. F.	2	167	1000
G. Meany	O. F.	4	000	1000
W. Markowsky	I. F.	1	000	1000

THE RUBBER TRADE IN THE EAST AND SOUTH

By Our Regular Correspondent

The Staybestos Manufacturing Co., 5522 Lena street, Germantown, Philadelphia, Pennsylvania, has purchased a lot at Germantown avenue, Apsley and Berkley streets, on which a factory is in course of erection which it is expected will be finished about the first of the year. The new building will be occupied by the Staybestos Manufacturing Co. and the National Asbestos Co., separate concerns but financed by the same people. The National company manufactures woven asbestos products which are sold in the untreated state in which they come from the looms, while the Staybestos company manufactures brake linings and other asbestos products for the automobile industry.

NEW YORK NOTES

The Ackurate Rubber Co., Inc., 253 Broadway, New York City, recently incorporated in New Jersey for the manufacture of insulating tapes, compounds, etc., has already put on the market its "Ackerman" friction tape, in novel paper cartons. The New York trade is being handled direct and agencies in the principal cities of the United States will be established.

The Edward A. Cassidy Co., 23-31 West 43d street, New York City, is the sales division of The Sterling Varnish Co., Pittsburgh, Pennsylvania, which manufactures "Nitrex," a substance for painting spare tires to prevent oxidation and the collection of rust on tire rims. This specialty was described in our January issue.

The Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pennsylvania, has acquired control of the International Radio Telegraph Co., 326 Broadway, New York City, an operating organization engaged in radio communication, etc. The older International Radio Telegraph Co. has been reorganized with a capital of $1,250,000 preferred stock and 250,000 shares of common stock of no par value.

The officers are Guy E. Tripp, chairman; E. M. Herr, president; S. M. Kintner, Calvert Townley, and H. F. Davis, vice-presidents, and J. V. L. Hogan, manager. All of these are Westinghouse officials except Messrs. Kintner and Hogan, who were president and manager respectively of the older company. The Westinghouse has equipped a special factory at East Springfield, Massachusetts, for the manufacture of wireless apparatus.

Gaston, Williams & Wigmore, Inc., formerly at 39 Broadway, has removed to the Buckley-Newhall Building, 100 West 41st street, New York City, where it has leased three floors and basement for 15 years. The October number of the *G. W. W. Bulletin,* the company's house organ, devoted the first page to a brief account of the removal and the reasons for it, accompanied by a photograph of the building where its new quarters are.

The Fellsen Tire Co., 1995 Broadway, New York City, has increased its capital from $30,000 to $100,000.

The Walters Rubber Co., Inc., of New York, Mineola, New York, is the Long Island distributer for Federal and Amazon tires, Firestone truck tires, and Walters tubes. H. S. Walters is president.

SOUTHERN NOTES

The India Tire & Rubber Co., Akron, Ohio, has appointed The General Auto Supply Co. its distributer in Richmond, Virginia, and vicinity.

The Cumberland Tire & Rubber Co., Inc., Louisville, Kentucky, has purchased the plant, property, and assets of the Ten Broeck Tyre Co. of the same city, including the textile fabric mill. The offices are at 26th and Courtney streets. The Cumberland company will make cord tires and tire fabric exclusively and will be able to sell cord tire fabric to outside buyers above its own requirements. The officers of the company, which was recently incorporated, are: F. W. O'Brien, president; S. J. Dant, secretary and treasurer; and A. L. Henry, chairman of the board of directors. Production is looked for sometime in November. The name "Ten Broeck" will be discontinued, the company featuring its own name, "Cumberland," as its brand.

The McClaren Rubber Co., Charlotte, North Carolina, has appointed the J. D. Bowen Co. its Florida distributing representative at 327 Laura street, Jacksonville, Florida, with a branch at Tampa, in the same state.

The Victory Rubber Manufacturing Co., 259 Peachtree street, Atlanta, Georgia, has its factory at East Point in the same state and was recently incorporated to manufacture "Sealtyte Leak-Proof" inner tubes. The officers of the company are: Homer S. Prater, president; George J. Reuter and W. H. Camp, vice-presidents; B. Graham West, secretary-treasurer; and the following directors in addition to the above—A. P. Phillips, C. W. McClure, W. M. Morris, A. McD. Wilson, T. L. Shapard, and Dr. James N. Brawner.

Frederick J. Schlosstein was appointed receiver of the Baltimore Rubber Tire Manufacturing Co., Inc., Monument and 11th streets, Orangeville, Baltimore, Maryland, on October 1, 1920. In addition to the entire stock of finished tires, the equipment of the plant, or the plant and equipment together, will be disposed of. The property, which is located on the main line of the Pennsylvania railroad, consists of several large, modern, daylight brick buildings and tire manufacturing machinery.

It is estimated by the Goodrich News Bureau of The B. F. Goodrich Co., Akron, Ohio, that at least half a million people will spend all or part of this winter in the South. According to the severity of the winter in the North, this number may be twice as large. Florida and California are the popular winter resorts and many people travel to these points by automobile. The Goodrich Travel and Transport Bureau is collecting the latest information regarding the roads throughout the South and on the Pacific Coast and will distribute it to motorists without charge on request.

The Virginian Rubber Co., Charleston, West Virginia, has increased its capitalization from $1,200,000 to $2,500,000. Its plant is nearly completed and will be in operation by the first of December, it is hoped. Tires and tubes will be produced.

The new tire branch recently opened in Louisville, Kentucky, by The Miller Rubber Co., Akron, Ohio, will be managed by G Lund. The branch will cover the territory of western Kentucky and southern Indiana.

THE RUBBER TRADE IN NEW JERSEY

By Our Regular Correspondent

THE NEW JERSEY STATE FAIR

The Thermoid, Semple and Home Rubber companies had attractive booths at the recent Trenton State Fair All three companies showed the raw product in the various stages and explained to the patrons of the booths just how tires and other rubber products are manufactured.

The Thermoid company representative in charge handed out blanks to all persons who stopped at the booth and asked them to sign name and address for the drawing of a tire. The names were deposited in a box, and after the drawing the lucky one secured free one of the best tires made by the company.

For the purpose of distributing advertising literature for the Thermoid Rubber Co., Chester Charles, an aviator connected with the advertising department of the firm, made daily flights at the fair. Those who happened to find one of the Thermoid circulars were entitled to a drawing for an expensive Thermoid tire. Young Charles received his air training while in army service.

The Semple Company, which manufactures tubes exclusively, had a sign displayed bearing these words: "All our energy and thoughts are focused on just one product—tubes."

The Liberty Tire & Rubber Co. had an attractive booth and six representatives engaged during the week in selling stock in the concern.

One of the feature events of the automobile races was the Ajax Trophy Sweepstakes. The distance was fifteen laps and the prize money amounted to $1,200, in addition to a handsome trophy donated by the Ajax Rubber Co., of New York.

Barney Oldfield, president of the Oldfield Tire Co., Cleveland, Ohio, who was one of the judges, distributed several hundred miniature automobile tires—made of real rubber—to his friends and to those whom he met at the fair grounds. The tires were four inches in diameter and can be used as paper weights. Oldfield's special automobile, used in many famous races, was demonstrated.

TRENTON NOTES

While automobile tires and tubes are at present selling at greatly reduced prices, the Trenton dealers announce a 20 per cent increase in the prices of all motorcycle and bicycle tires. This is the second recent jump in motorcycle tires. The demand for bicycle and motorcycle tires has greatly increased of late.

The Bergougnan Rubber Corporation, Trenton, announces that it is the only Trenton tire manufacturer selling tires with mileage insurance. The company claims that buyers are entitled to protection and that mileage insurance protects them. With each tire sold the company gives a written agreement.

Papers of incorporation have been filed by the Ewing Rubber Co., of Trenton, for the purpose of manufacturing inner tubes, patches, etc. The authorized capital stock is $100,000. The offices and plant of the company will be located at Homan and Hilton avenues, where the A. F. Updike Rubber Co. recently ceased business. The incorporators of the new company are Archibald F. Updike, James Schultz and Alice Emrick. The Updike Rubber Co. recently erected a plant in the Hillcrest section, where it manufactured tubes and patches. Edwin H. Steel was president of the corporation, while A. F. Updike was secretary-treasurer.

John A. Lambert, treasurer and general manager of the Acme Rubber Manufacturing Co., and president of the Trenton Chamber of Commerce, is at the head of a committee to urge the building of new homes with the aid of building loans.

The Montclair Rubber Co., Trenton, has changed its name to the Montclair Linoleum & Rug Co.

The Para Rubber Co., 121 East Hanover street, Trenton, has recently changed hands. Irving L. Wright, president and treasurer of the company, has retired from the business. C. E. Bevington and Vernon Jones are the new owners.

J. Cornell Murray, secretary and treasurer of the Empire Tire & Rubber Corporation, Trenton, who recently underwent an operation for appendicitis at the Mercer Hospital, Trenton, has recovered.

The firm of Joseph S. Papier and Philip Papier, dealers in automobile tires and accessories, Trenton, has been dissolved. The former takes over two stores, while Philip Papier will continue the East Front street tire shop.

Judge Lynch in the United States District Court has named John O. Bigelow, of Newark, as receiver for the Trent Rubber Co., Trenton, tire manufacturer. The receiver was named upon the petition of the McLain, Hadden, Simpers Co., a Pennsylvania corporation, and Carl Ludwig, New York, on behalf of themselves and other creditors and stockholders of the company. H. A. Ludeke, president of the company, in an affidavit, contends that the corporation is solvent, but that because of inability to get its plant in operation upon the date desired, it lost the spring trade, and that it is without sufficient ready cash to meet its obligations. The present stringency of the money market also added to the difficulties of the concern. I. A. Worthington is vice-president of the company, and E. H. Unkles is secretary and treasurer. All are Trenton men.

"The Story of the Tire," a three-reel picture, was recently shown at the K. B. Motor Sales Shop, Trenton, by The Goodyear Tire & Rubber Co., of Akron, Ohio. A special representative was sent from the factory to explain the various abuses which cause a tire to go out of service before it has rendered normal mileage, and how they can be prevented. Just how a tire is made by workers in the Goodyear plant was also shown.

MISCELLANEOUS NEW JERSEY NOTES

De Mattia Brothers, Inc., manufacturers of tire building equipment, will erect a three-story machine shop addition to the plant at Garfield, New Jersey.

The Rubber Products Co., of 411 Wilson avenue, Newark, will shortly erect a one-story brick and cement machine shop to cost $5,000.

The Smith Rubber & Tire Co., Inc., 625 Main avenue, Passaic, New Jersey, invited all of its stockholders to make a personal inspection of its new factory on Columbus Day. A large number responded and refreshments and music were furnished. The company owns eight acres of land on which it plans to build other structures in the spring. The present factory is located on the Erie Railroad, ten miles from New York. Mechanical rubber goods will be added to the company's lines.

THE RUBBER TRADE IN MASSACHUSETTS

By Our Regular Correspondent

A change in buying sentiment is being felt in the New England rubber trade, especially in tires. People are still buying conservatively, but it is believed that the bottom has about been reached. The publicity given by The B. F. Goodrich Rubber Co. to the fact that tires are actually 20 per cent cheaper and of better quality than in 1910, whereas the prices of most other commodities have been sky-rocketing, has had telling effect. After a thorough survey of the national market most Massachusetts dealers are agreed with James J. Rosenfield, general manager of the Boston Auto Tire Exchange, who regards the 1921 outlook most encouraging, as a result of the stabilizing influences of the past few weeks.

Keeping the highways open during the winter months is one of the big problems in making truckportation the success it must be to meet present and future traffic needs. Urged by the leading industries of the state, Massachusetts has taken up the matter with characteristic promptness. The legislature of 1920 passed an act authorizing the Department of Public Works to cooperate with city and town authorities, and to accept financial or other assistance from individuals, partnerships and corporations. The state is to furnish suitable equipment, to supervise its use, and during the years 1920 and 1921 may expend such sums as may be appropriated by the General Court not exceeding $50,000. Forty plows have been purchased to be operated in conjunction with motor trucks, and the commissioner of public works desires to ascertain what individuals or corporations will in time of need furnish trucks and operators to work these plows, as the appropriation is insufficient to carry out the project without considerable cooperation from the industries which are to benefit by it.

The plan is to keep open the trunk line highways in the territory about Boston, including Lowell, Lawrence, Lynn, Salem, Haverhill, Fitchburg, Taunton, Brockton, Fall River, New Bedford, to the State line on the Providence road, Worcester, Springfield to the Connecticut line, Holyoke and Chicopee Falls.

BOSTON NOTES

Highway and housing conferences featured the annual meeting of the Massachusetts Chamber of Commerce at the Hotel Vendome, Boston, October 15. E. F. Broadwell, vice-president of The Fisk Rubber Co., Chicopee Falls, Massachusetts, spoke on "The Business End of Highways; Are Good Highways Good Business?"

Henry C. Link, service supervision department of the United States Rubber Co., and Dr. R. S. Quinby, service manager of the Hood Rubber Co., were among the speakers on the program for the Human Relations Section conferences of the Associated Industries of Massachusetts, held in Boston October 28 and 29.

Stanley L. Blood, district manager for the New England territory of the Dayton Tire Co., has been promoted to general sales manager at the factory at Dayton, Ohio. Mr. Blood enjoys a wide acquaintance in the trade and is regarded not only as a successful distributer but as a general merchandising expert of exceptional ability.

Frederic C. Hood, treasurer of the Hood Rubber Co., Watertown, delivered a notable and timely address on the subject of "Stability of Industrial Capital" at a luncheon October 28 at the Copley-Plaza Hotel, Boston, in connection with the annual meeting of the Associated Industries of Massachusetts.

"Bring your lunch" clubs, as a protest against excessive restaurant prices, are rapidly increasing in Boston. At The B. F. Goodrich Rubber Co. branch both the men and women have a club, and rooms are provided for the purpose, including a fully equipped kitchen, dishes and silver. The men bring their own lunches and the women cook theirs at a total cost of 20 cents a day per person for supplies. Five girls in rotation prepare the meal for the other sixty and splendid cooks many of them are proving to be.

MISCELLANEOUS MASSACHUSETTS NOTES

The biggest boot and shoe ticket in the history of the Converse Rubber Shoe Co., Malden, Massachusetts, is now being turned out and yet the demand for its goods is not being filled. A daily total of 17,500 pairs of all kinds of footwear was recently reached. The tire division is maintaining two shifts of workmen. No reduction is contemplated and no employes have been laid off through lack of work.

Dr. R. S. Quinby, service manager of the Hood Rubber Co., Watertown, is a member of the executive committee, representing the rubber industry of the Council of Management Education which has been created to put into operation the plan for training executives for the principal American industries in colleges and technical schools that was advocated by Dr. Hollis R. Godfrey, of Drexel Institute. It is apparent that the shortage of trained industrial engineers must be relieved by closer cooperation between manufacturers and institutions of learning, and the Council of Management Education has been organized to become a clearing house to promote a better understanding of the mutual problems of college and industry and to keep a perpetual inventory of the educational needs of industry and the ability of colleges to meet them.

The Fisk Rubber Co., Chicopee Falls, Massachusetts, has been a leader in accident prevention work in rubber mills. What such a campaign will accomplish is shown by the success of its recent "no accident week," when no loss-of-time accidents were reported. The campaign was continued for another week with the same result. This is a splendid example of what it means to make factory carefulness a common habit.

A comprehensive plan for the cooperation of the public schools and the industries of Massachusetts in the work of immigrant education was adopted unanimously by the delegates at the recent Plymouth Conference under the joint auspices of the State Department of Education and the Associated Industries of Massachusetts. The recommendations for procedure by the two agencies are as follows:

1. THE SCHOOLS: (a) accept provisions of Chapter 295, Acts of 1919; (b) appropriate enough money to get the job well done; (c) provide for classes in industries whenever organized; (d) provide a director of immigrant education; (e) train and supervise teachers; (f) provide suitable text material including motion pictures; (g) organize courses of study.

2. THE INDUSTRIES: (a) Centralize responsibility in a plant director or committee or other effective agency; (b) conduct preliminary study to learn the extent and nature of the problem; (c) recruit classes; (d) provide satisfactory school accommodation; (e) establish an efficient follow-up; (f) provide incentives; (g) collaborate in training teachers and in providing special text material.

Loyalty service pins were recently presented by Frederick H. Jones, president of the Tyer Rubber Co., Andover, to all employes who have been on the company's pay-roll for a year or more. Two women received 35-year service pins, and a number of workers, both men and women, received 25-year pins. Mr. Jones has himself been with the company for 35 years.

The Tyer Rubber Co., Andover, Massachusetts, through the athletic committee of the Tyrian Service Association, has arranged a bowling league composed of teams representing different factory departments. This committee has also been instrumental in the organization of a bowling league made up of teams from the different manufacturing plants of the town, and known as the Andover Industrial Bowling League. Schedules for both leagues begin in November.

THE RUBBER TRADE IN RHODE ISLAND

By Our Regular Correspondent

THE FUEL SITUATION, with its shortage of supply and the increased price of bituminous coal, together with the lack of cars for the shipping of completed products, is causing the manufacturers of rubber goods in Rhode Island and vicinity much concern and it is feared that these conditions may become gradually worse. These problems, together with those concerning labor—wages, hours and the securing of experienced employes—are materially affecting all industrial prospects. Great efforts, however, are being made to establish Providence as one of the principal ports of entry on the Atlantic seaboard and already various projects are under way, fostered by the Providence Chamber of Commerce, for new steamship lines. One of these is the extension of the Merchants and Miners Line from its present terminal to Baltimore; a new line is proposed to Philadelphia; another to Manchester, England, and a fourth to Cuba. The Fabre Line to the Azores, Lisbon, Marseilles and Rome has recently announced an expansion of its service, so that altogether the future for freights, domestic and export, looks very encouraging.

While there is a general policy of curtailment throughout the textile industry with the shutting down of plants to a schedule of three or four days a week, or a reduction of operating force, there has been no indication of general curtailment among the rubber manufacturers. Business among the manufacturing rubber concerns of Rhode Island continues good, though not driving, and most of them have sufficient orders on their books to keep them in full operation for an indefinite number of months.

A majority of the 2,000 operatives composing the working force in the three plants of the Jenckes Spinning Co. in Pawtucket and Central Falls, have accepted a 15 per cent reduction in wages rather than have the mills shut down for an indefinite period. A short time previous to this agreement a cut was made in the wages of a number of the employes at these plants ranging from 12 to 20 per cent, but this has been adjusted on the uniform basis of a 15 per cent cut. The Jenckes Spinning Co. had been running its plants day and night up to about the first of September, when the day schedule alone was introduced. The company controls three plants, the Jenckes Spinning Co. on Barton street, Pawtucket; the Tamarack Mill on Front street, Pawtucket, and the Central Falls Mill, formerly the United States Cotton Co. The company manufactures tire fabrics as its principal product.

During the past summer practically all of the plants in the

state have been thoroughly overhauled and renovated so that they are now in the best physical condition that they have been since the beginning of the World War, six years ago. Additions that have been under way at several of the plants have been completed, thereby increasing the capacities to a very appreciable extent, while several others have been commenced.

Ground was broken about the middle of the month for a new addition to the wire manufacturing division of the National India Rubber Co.'s plant at Bristol, Rhode Island. The structure is to be located east of the main wire building and will be of brick and mill construction, two stories high and about 100 by 180 feet. When completed the new building will give an increase in floor space of upwards of 30,000 square feet. The new building will be used for the braiding departments, and 192 triple-decker, weather-proof, wire-braiding machines will be installed, making a total of 1,400 braiding machines in the company's wire division.

An Americanization school has been established at the plant of the National India Rubber Co. at Bristol, Rhode Island, which is in charge of the Industrial Relations Bureau, and is under the personal supervision of Mrs. Bacon. The school was opened on September 9, when more of the employes of the plant than could be accommodated under the present arrangements applied for admission. A spacious schoolroom has been provided and furnished with all modern appointments, and there is an efficient corps of teachers. Classes are to be held from 8 to 4 o'clock, five days a week, and the employes are to receive their pay during the time that they spend in the school-room. After the school is fully established on its regular schedule of classes it is expected that at least 200 employes will be accommodated, the majority of whom at present are able to speak but little English.

The valuation on the taxable property of Providence has been announced by the Board of Tax Assessors for this year, and the list contains a number of individuals, firms or corporations identified with the rubber manufacturing industry or its kindred and allied trades that are assessed on a valuation of $50,000 or more. Among these are the following, together with the amount of their assessment: American Multiple Fabric Co., $117,580; Walter S. Ballou, $91,840; estate of Joseph Banigan, $1,139,120; Mary Banigan, $50,720; Augustus O. Bourn, $95,140; Bourn Rubber Co., $292,580; Samuel P. Colt, $340,240; Davol Rubber Co., $627,100; Mary E. Davol, $874,200; Glendale Elastic Fabric Co., $217,300; International Braid Co., $1,215,320; Mechanical Fabric Co., $177,400; Eugene R. Phillips, $153,700; Revere Rubber Co., $2,000,000; Rhode Island Hospital Trust Co., trustee under will of Joseph Davol, $391,600; United States Rubber Co., $3,618,920.

More than 250 employes of the Bourn Rubber Co., Providence, attended the annual outing that was held at Emery Park about the middle of the past month. The party proceeded from the company's plant on Warren street by special conveyance to the grounds, arriving shortly after 12 o'clock, when a luncheon was served, after which the boot cutters defeated the boot makers' team, 11 to 8, in an exciting baseball game, which was one of the principal events on the sporting program of the afternoon. The tug-of-war between the married and single women was won by the married team. The day's outing concluded with the clambake at 4 o'clock.

The Westerly Textile Co. and the Ninigret Co., at Westerly, Rhode Island, that have been working on orders for The Goodyear Tire & Rubber Co., Akron, Ohio, have completed their contracts and temporarily discontinued the production of tire fabric, as there have been no renewals with the Goodyear people, although it is expected that new contracts will be made at an early date that will insure active operations for some time to come.

The Atlantic Tubing Co. is taxed on a property valuation of $67,270 in the city of Cranston, Rhode Island, according to the assessments levied for this year by the Board of Assessors as certified to the city treasurer for collection. Others paying taxes on $5,000 valuation and over are; Arch Narrow Fabric Co., $18,075; William B. Banigan estate, $46,900. In the town of East Providence the American Electrical Works is taxed on $838,590, and the Washburn Wire Co. on $585,050.

The Central Warp Co. is one of the busiest concerns in the Blackstone Valley and is running to its full capacity, with an increase of orders coming every day. The manufacture of yarns for tire fabrics is one of the most important branches of the concern's business and is expected to become more important in future operations.

The Lynn Rubber Co., of Warren, Rhode Island, has made a trust deed of $100,000 to the Industrial Trust Co., which has been recorded at Warren. The bonds are guaranteed by the Kleistone Rubber Co., which has leased the property of the Lynn Rubber Co., at Warren, both real and personal, as a going concern for ten years with an option to purchase at a fixed price.

George L. Drown, Jr., for 15 years in the employ of the United States Rubber Co., has been transferred from the National India Rubber Co., where he was foreman of the binding and spreading departments, to the new Colt plant at Providence, where he is in charge of several departments.

Harlow W. Waite, who for some time has been factory manager in charge of the Revere plant of the United States Rubber Co. on Valley street, Providence, has been transferred to a position of greater responsibility in New York.

James Q. Dealey, Jr., son of Professor Dealey, of Brown University, and now associated with the Lycoming Rubber Co., of Williamsport, Pennsylvania, a subsidiary of the United States Rubber Co., has been named as the 1920 Rhodes scholar from Rhode Island. He was chosen by the electors from four candidates for the appointment. He was a member of the class of 1920 at Brown and since leaving college has been connected with the Industrial Relations Department of the Lycoming Co., and is now managing the factory newspaper, which he recently inaugurated.

THE RUBBER TRADE IN OHIO

By Our Regular Correspondent

AKRON NOTES

Akron, the rubber center of the world, is the thirty-second city in size in the United States, according to the Federal census made public recently.

Summit County, of which Akron is the county seat and hub, including Barberton, Kenmore and Cuyahoga Falls, all small but energetic manufacturing cities, has a population of 286,065 persons. This is an increase of 177,812, or 164.3 per cent over the population ten years ago.

Summit County is now the third largest county in the state of Ohio, Cuyahoga County, of which Cleveland is the hub, being first, and Hamilton County, containing Cincinnati, being second.

The population of the state of Ohio has increased more than 1,000,000 the past ten years. The total has been announced as approximately 5,757,461 for 1920 as compared with 4,767,121 in 1910. This is an increase of 20.8 per cent. Only one county is missing from the Ohio census figures. Ohio leads the United States in the number of cities having over 200,000, having five such cities, and ties Massachusetts with seven cities over 100,000, being exceeded by none.

The increased population is mainly in the cities, the rural counties as a rule remaining practically stationary or losing. The increase is obviously due to the greater manufacturing carried on in the state. During the war the Government census of manufacturing districts showed that a circle with a 200-mile radius with Pittsburg as a center would include more than 30 per cent of the manufacturing area of the whole United States. Akron and Summit county are in that area, as is Cleveland, Lorain and other eastern Ohio cities.

The increasing population of cities in Ohio has led to considerable speculation regarding the future food supply of the country, which was one of the principal topics of discussion at the annual meeting of the Federal Highway Council at Akron the latter part of September.

L. J. Taber, master of the Ohio State Grange, at a dinner given the Council by the Akron Chamber of Commerce at the Portage Country Club, warned highway builders, automobile and truck men that the time has come when the food supply of the nation is menaced by the fact that the farms are being depleted because of the wages paid by the industries in the cities. He cited Akron as an example and was frankly pleased to learn that men are going from Akron back to their homes on the farm.

The eight speakers who followed Mr. Tabor dwelt mainly upon the necessity for increased rapidity of transportation from the farm to the cities to overcome the scarcity of help on the farms. Among them were Paul W. Litchfield, factory manager of The Goodyear Tire & Rubber Co.; F. S. Holbrook, vice-president and treasurer of the American Railway Express Co.; S. M. Williams, chairman of the Council; A. R. Kroh, of The Goodyear Tire & Rubber Co.; Dr. R. S. McElwee, of the foreign bureau of the Department of Commerce, and David Beecroft, of the Class Journal Co., of New York City.

Mr. Litchfield asserted that the pneumatic tire will replace the solid tire in truck transportation because it is better able to stand the hard bumps of the road with heavy loads. Multiple-wheel trucks will be the ultimate means of carrying heavier loads at greater speeds. He said that the Goodyear company employs two men in agriculture to each man employed in the rubber mills. For every pound of cotton grown for tires on the Goodyear plantations two pounds of food are raised.

Dr. McElwee believes that the industries of the country are producing more than the home market can consume and the only hope for keeping the mills of America running at top speed is to enlarge our foreign commerce. The United States, he said, has become the trade center of the world, following the world war, and foreign trade alone will make it possible to take care of our increasing manufacturing plants and industrial population.

One of the first problems to be taken up by the Council is an adequate supply of water for home and industrial consumption.

Horseback riding in the home of the automobile tire promises to be revived through the formation of a group of cavalry as one unit of the Ohio National guard stationed at Akron. The troop is being organized by Major Joseph Johnston, son of W. A. Johnston, president of the Rubber Products Co., Barberton, Ohio. It will consist of thirty saddles. Several years ago when automobiles were not as popular as now, Battery B of the national guard made Sunday riding popular. The fact that H. S. Firestone, president of the Firestone Tire & Rubber Co., established a riding school at his home last winter that may be repeated this year lends additional support to the belief that riding horses will again become popular here.

Much speculation has resulted from a visit to Akron by Henry Ford, head of the Ford Motor Co., of Detroit, and his son Edsel, active head of the company. They spent two days late in September with H. S. Firestone, president of the Firestone Tire & Rubber Co. Coming directly after the announcement of decreased prices for Ford automobiles his visit was for a time looked upon as a step to lower the price of automobile tires. Mr. Ford was quoted in Canton and Cleveland newspapers to the effect that he intended building his own tire factory, but Mr. Ford denied having given out such an interview.

The agreement reached with the mine operators, railroads and dealers by the transportation department of the Chamber of Commerce before the Interstate Commerce Commission has resulted in more than 16,000 loads of coal being distributed in Akron during the past month. According to W. W. Hall, traffic commissioner of the Chamber, conditions will not be serious this winter unless strikes prevent the mining or moving of coal.

Ralph H. Upson, holder of the Gordon Bennett International balloon race trophy, Akron's best-known aircraft man, has resigned from his position as head of the aeronautical department of The Goodyear Tire & Rubber Co. to develop a commercial "lighter-than-air" transportation company. Mr. Upson has maintained for several years that the rigid type of lighter-than-air craft is the ultimate solution of the lighter than air problems and this is the type of machine his new company will develop.

According to factory heads the educational literature sent out by Akron tire companies regarding the preservation and care of tires to get maximum mileage has resulted in an increase of more than 20 per cent in the service given by tires, and this as a consequence has decreased the sale of tires to some extent. This campaign will be enlarged during the next few years, it is said.

The first temporary grade separation on Miller avenue, the main artery to the Firestone Tire & Rubber Co. and The B. F. Goodrich Co., has been opened by the city of Akron and the railroads. For many years the traffic to these two plants has been held up by railroad traffic. The city and railroads will spend $3,000,000 in building other separations over railroad tracks during the next few years. This will remove one of the worst handicaps to transportation in the city.

W. R. Ridge, president of the Rubber Engineering Co., Akron, has resigned his position as president of the Andes Tire & Rubber Co., Toledo, Ohio, to which he was elected some time ago, in order to devote his entire time to rubber engineering and other business interests.

W. H. Barkwill, Akron, has purchased the mold manufacturing department of The Die Sinking & Machine Co. of the same city, and will continue the business under the same name. He expects to incorporate and build a larger plant.

J. W. Jordan, for ten years in the accounting department of The B. F. Goodrich Rubber Co., and for the past few years assistant auditor, has been made auditor of the company to succeed W. Murray, who recently resigned.

John R. Gammeter, head of the experimental department of The B. F. Goodrich Rubber Co., advised Akron business men to prepare to do business on a pre-war basis at a dinner given by the Akron Builders' Exchange recently.

J. C. Clinefelter has been promoted from the position of production superintendent to that of sales manager of The Akron Standard Mold Co., Akron, manufacturer of rubber molds and machinery. He was formerly chief engineer of The Portage Rubber Co., Barberton, Ohio, and previous to that was assistant chief engineer for the Republic Rubber Corporation, Youngstown, Ohio.

More than 8,500 employes of The Goodyear Tire & Rubber Co. voted in the second annual election of the company's industrial republic held recently. More than 1,000 women went to the polls.

Six of the ten present members of the Goodyear senate seeking reelection were defeated in their senatorial districts in the factory. Of twenty-three members of the house of representatives, running for second terms, only ten were reelected. Senator E. J. Hard, first president of the Goodyear senate, was defeated by twenty-two votes for reelection by Fred Arbogast. J. B. Long, speaker of the lower house, was reelected.

Both houses of the industrial assembly will convene early in November to elect presiding officers for the year. P. W. Litchfield, vice-president and factory manager, who conceived and established the Goodyear industrial republic, will continue to sit in the same relation to the industrial legislators as the President of the United States to Congress.

In such capacity during the first year of the republic's operation

Mr. Litchfield never was required to exercise his veto power over bills passed by either house.

CLEVELAND NOTES

Lawrence A. Subers and others, Cleveland, Ohio, have filed a bill in equity in the Court of Chancery of Delaware against the American Rubber Products Co. and the Continental Securities Co., alleging the illegal control, holding and sale of a large portion of the common shares of the American Rubber Products Co. and asking for injunctions.

The Ideal Tire & Rubber Co., East 17th street and Euclid avenue, Cleveland, Ohio, manufacturer of "Greyhound" tires and tubes, has taken over the Porter Rubber Co. of Salem, Ohio, and begun to manufacture tires at that plant. I. R. Davies is president and general manager.

MISCELLANEOUS OHIO NOTES

C. C. Mosher, vice-president of the company, has been appointed receiver of The East Iron & Machine Co., Lima, Ohio, by the United States District Court, Northern District of Ohio, Western Division. This action has been taken, it is claimed, to protect creditors and the company itself during the general restriction of credit, pending the realization of financial plans to meet increasing business. It is said that the company has a fine surplus and is doing all the business it can finance. Plans to increase the working capital are already under way.

The Oak Rubber Co., Ravenna, Ohio, which has been building a new and larger factory for the manufacture of dipped rubber goods and toy balloons, expects to start operations at an early date with the production of 150,000 balloons daily. The most modern equipment has been installed, including new types of machines approved after experimentation. The officers of the company are: Paul E. Collette, president and treasurer, and John W. Shira, secretary and superintendent.

Barberton, the home of the Rubber Products Co., has organized a Chamber of Commerce. W. A. Johnston, president of the company, was one of the principal organizers.

The Allied Belting Co., Greenville, Ohio, has completed a new brick, concrete and steel factory building, to which it is moving its factory and equipment from Toledo. It has also increased its capital stock from $60,000 to $100,000.

The Climax Rubber Co., with general offices at 21 West Gay street, Columbus, Ohio, has its factory at Huntington, West Virginia, where it manufactures its specialty, the "Climax Compression" inner tube. The officers of the company are: Irving S. Hoffmann, president; H. A. Longshore, vice-president; Merch E. Swanson, secretary-treasurer; and Clyde B. Turner, assistant secretary-treasurer.

The factory and equipment of The Central Rubber Reclaiming Co., Defiance, Ohio, was recently purchased by I. J. Cooper, Cincinnati, and J. F. Schafer, C. E. Hart and D. E. Reynolds, Findlay, Ohio. The company is specializing on the reclaiming of raw scrap friction and also produces a complete line of reclaims for all uses. The new officers are: J. F. Schafer, president; C. E. Hart, vice-president; D. E. Reynolds, secretary and treasurer. A. T. Oakley is general manager.

THE RUBBER TRADE IN THE MID-WEST

OCTOBER MEETING OF MID-WEST RUBBER MANUFACTURERS' ASSOCIATION

The regular monthly meeting of the Mid-West Rubber Manufacturers' Association was held at the Chicago Athletic Association on October 19, the meeting having been postponed one week on account of the regular meeting date falling on Columbus Day. Forty members were in attendance and after the meeting interesting remarks were made by a number of those present, including Joseph F. McLean, Pequanoc Rubber Co., Butler, New Jersey; H. F. Harrah, National-Standard Co., Niles, Michigan; Thomas M. Gardner, Brighton Mills, Passaic, New Jersey; P. E. Findlay, Bibb Manufacturing Co., Macon, Georgia; Charles W. Bliss, Chicago, Illinois; Raymond T. Bill, *Tires*, New York City; Theodore E. Smith, *The India Rubber Review*, Akron, Ohio; J. E. Grady, Archer Tire & Rubber Co., Minneapolis, Minnesota; W. F. Hendrick, Rotary Tire & Rubber Co., Zanesville, Ohio, and E. A. Armstrong, Cleveland Rubber Corporation, Cleveland, Ohio.

A note of optimism was evident in what nearly all of the speakers said, the apparent feeling being that business in the tire industry was already on a firmer basis and that demand was increasing among the dealers.

President John T. Christie read the brief which he had prepared and filed with the Federal Trade Commission in opposition to the continuance of the practice of guaranteeing tire prices against a decline. This was listened to with great interest and appeared to meet the hearty approval of all present.

The following new members were elected:

Regular Member: Malay Rubber Co., 1035 Guardian Building, Cleveland Ohio.

Associate Members: The Akron Gear & Engineering Co., 42 East South street, Akron, Ohio; The Williams Foundry & Machine Co., 52-56 Cherry street, Akron, Ohio.

MISCELLANEOUS MID-WESTERN NOTES

The Wildman Rubber Co., Detroit, Michigan, broke ground on October 12 for its new factory at Brooks, Bay City, in the same state. The company owns sixty acres of land and its factory will be one of the largest in the city when completed.

The A. Plamondon Manufacturing Co., Chicago, Illinois, removed October 1 to its new location at 5301 South Western Boulevard.

The Monroe Tire Corporation, 1825 Michigan avenue, Chicago, Illinois, has been organized as factory distributer and jobber of tires, tubes and sundries. The officers are: Harold J. Samuels, president, and Leroy Eschner, vice-president and treasurer. They were formerly secretary and sales manager, respectively, of the World Tire Corporation, from which they resigned to go into business for themselves.

The Liberty Vulcanizer Manufacturing Co., Madison street and Ninth avenue, Milwaukee, Wisconsin, is removing to its new building at 1212-1214 National avenue. The company manufactures vulcanizing plants, separate molds, small boilers, various kinds of burners, and other equipment for repairing tires.

The India Tire & Rubber Co., Akron, Ohio, has appointed the Allen & Guard Tire Co. its distributer for the State of Colorado, with headquarters in Denver.

The Forest Products Laboratory, Madison, Wisconsin, has established practical monthly training courses to make available to manufacturers and packers the principles that underlie proper box and crate construction. The course consists of one week's instruction under a staff of competent specialists and the next one will be given from November 8-13, 1920. Those interested may obtain further information from the director of the laboratory.

Earle J. W. Fink, assistant general manager and general sales manager of the Mishawaka Woolen Manufacturing Co., Mishawaka, Indiana, manufacturer of felt and rubber boots and shoes, was married on September 10, 1920, to Miss Nina A. Gabel, a prominent musician and pipe organist, of the same city. The wedding was considered one of the social events of the year.

The Indiana Cord Tire Co., formerly of Mishawaka, Indiana, has changed its name to Burr Oak Cord Tire Co. and is now located at Burr Oak in the same state. The new officers are: R. W. Thomas, president; A. A. Peterson, secretary and general manager; G. E. Watson, vice-president; H. M. Cole, treasurer. The company has raised considerable capital in Burr Oak and is prepared to manufacture a high-class inner liner of merit.

The Oldfield Tire Co., Cleveland, Ohio, has appointed E. H.

Brandt northern district manager, with headquarters at Chicago. He will have charge of sales in eastern Montana, North and South Dakota, Wisconsin, Iowa, Nebraska, Illinois, Indiana, and Minnesota.

The National Association of Waste Material Dealers, Inc., will hold its next quarterly meeting at Chicago, December 8 and 9. The secretary is arranging for a special car from New York and members planning to attend the meeting are urged to reserve accommodations early.

The Prudential Tire & Rubber Co., 813 Hartford Building, Chicago, Illinois, has recently purchased the plant and equipment of The Great Republic Tire & Rubber Manufacturing Co. located at McAlester, Oklahoma, and will operate this modern factory at capacity. W. H. Owens, who was president and general manager of The Great Republic Tire & Rubber Manufacturing Co., has been retained by the Prudential as vice-president and operating manager of the Oklahoma plant.

Organized less than a year ago, the Prudential Tire & Rubber Co. has acquired three plants, the Boone tire plants at Chippewa Falls, Wisconsin, and Sycamore, Illinois, and the Great Republic plant here mentioned, and has also purchased a large tract at Erie, Pennsylvania, where they will build a modern factory early in the spring. Fred A. Seiberling, formerly of the Newcastle Rubber Co., is president of the Prudential, and associated with him is his brother, A. G. Seiberling, vice-president of the Haynes Automobile Co.

THE RUBBER TRADE ON THE PACIFIC COAST

By Our Regular Correspondent

The factories on the Pacific Coast that make tires and other rubber goods are busier than ever. Two of the larger mills, the Pioneer Rubber Works, San Francisco, and the Goodyear Tire & Rubber Company of California, Los Angeles, are steadily adding to their working force and expanding the scope of their operations. A very optimistic view of trade for many months to come is taken by rubber manufacturers and selling agencies on the entire western coast. Three factors referred to as promoting the generally hopeful spirit are: the unusually successful season experienced by the thousands of big fruit raisers, who are counted upon as liberal customers by tire makers and dealers; the rise in railroad freight rates, which is perceptibly aiding truck-portation; and the recent reduction in price of some of the well-known makes of automobiles. Tire repairmen also feel very confident that the factors noted will stimulate their business, and better sales of tread gum and other repair stock are reported by mills and supply houses.

LOS ANGELES NOTES

Rubber figured prominently at the National Tractor Show at Verdugo Woodlands, near Los Angeles, recently. Among the notable exhibits were belting for tractors, gasoline hose, steam hose, hose for spray rigs, packing for gas engines, for steam and cold water, and automobile radiator connections. The Goodyear Tire & Rubber Co. of California, made the principal display in these lines. The show was the largest of its kind ever staged in the West, 100,000 square feet of space being used for over 400 different exhibits.

Plans have been perfected whereby Los Angeles banks will lend cotton growers $7,500,000 for picking and ginning the 1920 crop on warehouse receipts, instead of personal credits, which will greatly relieve growers who have been unable to finance their crops beyond the harvest period. The sum of $1,000,000 was made available on October 15.

Business is reported by the several branches of the United States Rubber Co. on the coast to be away ahead of last year, and additions are being constantly made to the sales forces in the Pacific slope cities. The various branch managers are confident of a large increase in business for 1921.

Roy R. Meads, president and general manager of the Pacific Rubber Co., Los Angeles, has gone to Racine, Wisconsin, for a conference with the Horseshoe Tire Co., which concern his company represents on the Pacific Coast.

C. L. Reely, advertising and salesmanager of the Oldfield Tire Co., Cleveland, Ohio, has been visiting Hess & Sackett, Inc., Los Angeles distributers of Barney Oldfield's products.

Over 100 newspaper editors and publishers of Southern California were recent guests of the Goodyear Tire & Rubber Co., of California, and the scribes were much impressed with the magnitude of the plant in Los Angeles, the machinery used in tire-making, and the cotton mill, where cotton spinning and weaving are for the first time conducted on a large scale on the Coast. The Goodyear company has 2,200 men at work and the tire output has risen to 2,300 a day, with 2,500 tubes daily as well as a lot of automobile accessories. September sales were reported the largest in the company's history. An enterprise "on the side" is the Goodyear dirigible passenger-carrying line between Los Angeles and Santa Catalina Island, a 39-mile trip made daily by the Pony Blimp in sixty minutes.

Adolf Schleicher, president of the Samson Tire & Rubber Corporation, Los Angeles, recently spent five weeks studying the big tire factories of the Middle West. The Samson company claims the honor of having produced the first cord tires on the Coast.

SAN DIEGO

The new warehouse of the Spreckels "Savage" Tire Co., San Diego, is nearly ready for use. The building is 670 feet long and its walls and roof are wholly zinc-covered. It will have ten loading doors connecting with a spur of railroad track. The "Savage" factory reports business as excellent, and the company is now considering plans for largely increasing the output.

SAN FRANCISCO AND SACRAMENTO NOTES

The Plant Rubber & Asbestos Works, Inc., 537 Brannan street, San Francisco, California, has taken over the factory and business formerly operated by the Merle Magnesia Manufacturing Co. Magnesia and magnesia pipe and boiler covering are being produced at present and the company plans to offer carbonate of magnesia to the rubber trade in a short time. Plans have already been drawn for an extension to the plant to provide additional space. The officers of the Plant organization are: Sydney L. Plant, president and manager; Charles A. Wright, vice-president; Elliott H. Pierce, secretary; George J. Sivers, treasurer. The company also distributes the products of the Boston Belting Co., Boston, Massachusetts.

The Cleveland Rubber Mold Foundry & Equipment Co., Cleveland, Ohio, is planning to erect a branch plant on the Pacific Coast, in or near Sacramento, California.

A novel display at the recent state fair in Sacramento, California, was the power conservation exhibit of the California Electrical & Mechanical Engineering Co., in which was demonstrated the correct use of rubber belting in operating pumps, cream separators, washing machines, and other farm machinery by power. A unique feature was a threshing machine operated by a 150-foot, 8-inch, 5-ply endless belt, which continuously crushed brick-bats as easily as it threshed wheat.

W. S. Gelette, sales manager for the Rubber Products Co., Barberton, Ohio, who visited the Coast recently, has appointed V. W. Cunningham branch manager for San Francisco, succeeding Stewart Slosson.

The Howe Rubber Co., factory branch for Howe tires and tubes, has moved from 1214 Sutter street to larger quarters at 824 Ellis street, San Francisco.

SOUTHWESTERN NOTES

Long-staple cotton growers in California and Arizona are worried at the slow market for the commodity and the fact that Egypt is looking to the United States as an outlet for thousands

of bales of the long-staple product which Europeans are unable to buy. The Southwest cotton growers fear that the home market will be demoralized if the Egyptian article is allowed to come into this country duty-free, and they point to the fact that Egyptian producers can not only sell the cotton cheaper than the cotton of the Southwest as the labor cost is very much less, but they can also make a good profit on American exchange. Hence many cotton growers and factors are urging a protective tariff to save the Southwest product, especially on Pima or long staple cotton. Little competition is feared on the short staple cotton, as the Southwest practically leads the world in producing the latter, according to Secretary Robert C. Rowland of the Pacific Cotton Exchange in Los Angeles.

The American-Egyptian Cotton Growers' Association of Phoenix, Arizona, has been shipping 10,000 bales of Pima cotton to Los Angeles warehouses, where it will be stored until the market regains its equilibrium. The growers state that many of them would be almost bankrupted if forced to sell at present prices.

The International Cotton League of the West, which includes growers in the United States and Mexico, is now fully organized, and it intends to aid in getting federal legislation or other assistance in stabilizing the industry, as well as in safeguarding crops and seeds from pests. In the league are also state entomologists, state and county horticultural commissioners, and many brokers.

TYPES OF RUBBER FOOTWEAR ON THE PACIFIC COAST

Rubber footwear is gaining decidedly in popularity on the entire Pacific Coast, according to statements made by manufacturers' agents and the leading jobbers in that section. The demand is actually 100 per cent over that of a year ago, say the dealers, whose chief worry now is not so much to sell as to deliver the goods.

For the numerous beaches which line the 1,300 miles of Pacific littoral, and which are available the greater part of the year, there is a steadily-growing demand for women's canvas rubber-soled bathing shoes. Hitherto, they were made almost wholly in black and white uppers. This season, however, manufacturers have not only made the duck shoes more attractive, but they have also introduced many novel effects in tinted satine uppers with corrugated rubber soles. Women's white shoes having a much longer season here, the wearers seek more variety in them. The better class of women's sport shoes are now made quite as modish as leather footwear costing twice as much. They have finely-woven duck uppers, very flexible rubber soles, colored leather trimmings, and rubber-tipped high heels. An old-time objection that rubber shoes made the feet "smart" is said to be entirely removed by improved sole construction.

The high cost of leather footwear is the reason why a great number of men in towns and cities are wearing white duck rubber-soled shoes. Not only have they found that they cost only half as much as leather, but also that the white shoes deflect the hot rays of the sun better than leather, that they are lighter and give the wearer a springier gait. Demand runs strong, especially among the younger men, for white duck shoes trimmed with brown or black leather for every-day use. Among tennis players and athletes generally the canvas shoe with the suction sole is gaining favor, although many wearers of shoes with corrugated soles claim that when well made the latter are superior to "suctions."

In connection with rubbers worn in the rainy or winter season here an odd fact is noted. In the East, where downpours are more general and snow and slush often abundant, low-cut rubbers are in greatest demand. Yet in the Pacific Coast cities where snow is a rarity and the rainfall light high-cut or storm rubbers are preferred by men, and skeleton or toe-hold rubbers by women.

Rubber boots find ready sale among the fishermen who supply the great salmon canneries of the Northwest, the tuna packing establishments of the Southwest, in the logging camps, and in mining and rough construction work.

A type of rubber boot which is being widely used for very heavy service has an upper of coated duck with a rubber-fiber composition sole, which, it is claimed has proved to be more wear-resisting than the toughest leather. For mining work the boots are often ordered with the soles covered with 3/16-inch flat steel studs. Many mining and contracting concerns also use large quantities of rubber boots on which plain leather soles are nailed.

In the logging camps, as well as on the big ranches and in the citrus groves where much irrigation is constantly carried on, high and low red, brown, and black bootees are strongly favored as light, tough, waterproof and durable footwear. They have either stout rubber or composition soles with a heavy mail-bag duck upper, and with the toe given a 2-ply frictioned fabric box. These shoes have either strong linen or leather laces. One of the newer types of such shoes has a particularly well-made sole. It is constructed first with a rubber tap, then an inner rubber sole, two fillers, a treated shank and fiber sole, leather sock lining, a hollow, air-vented rubber heel, and finally a strip of light rubber, the whole being vulcanized to the canvas upper.

CANADIAN NOTES

The luxury tax on shoes in Canada has been increased from ten to fifteen per cent on all shoes retailing above $9, to become effective when the entire budget with the proposed amendments has been dealt with.

Direct exchange of parcel mails between Canada and France has now been resumed, Montreal and Havre being the terminals of the Canadian Pacific Ocean Services steamship line which acts as carrier.

The United Rubber Co., Limited, Bathurst street, Toronto, Ontario, was reorganized in March last, with capital amounting to $1,000,000, and the following officers and directors: Henry Stanyon, president and general manager; C. H. Stanyon, secretary-treasurer; E. A. Pill, Dr. Shier, and G. Wooten, directors. Henry Stanyon was formerly president and manager of the K. & S. Tire & Rubber Goods, Limited, Weston and Toronto, Ontario. The United company will manufacture tires and tubes, toy balloons, nipples and druggists' sundries.

Professor A. B. Macallum has accepted the newly created chair of biochemistry at McGill University, Montreal, Quebec, and has resigned as administrative chairman of the Honorary Advisory Council for Scientific and Industrial Research, to take effect as soon as his successor is appointed. He will, however, continue to be a member of the Council and take a considerable part in its work.

The Oak Tire & Rubber Co., Limited, 19 Dundas Street East, Toronto, Ontario, has reorganized and increased its capital to $3,000,000. It took over the Acme Tire & Rubber Co. and F. D. Law is managing director. The company's tires are sold under the trade mark "Royal Oak."

Arthur H. Marks, formerly with the United States Rubber Co., has acquired a large interest in the Van der Linde Rubber Co., Limited, Toronto, Ontario, and besides being on the directorate is also vice-president of the company. Victor van der Linde, manager of the factory, was formerly associated with The B. F. Goodrich Co. as development manager. The Van der Linde Rubber Co. is one of the most prominent Canadian organizations, and though it has other lines is particularly concerned in the manufacture of V. D. L. tires, the highest-priced made in Canada. The "V. D. L. Radio" cord made its first appearance on the market in 1918, the 30 by 3½ and 31 by 4 clincher "Radio" cord being the original light-car cord made in Canada.

THE EDITOR'S BOOK TABLE

THE COMPLETE GUIDE TO TYRE REPAIRING. HARVEY FROST & Co., Limited, London, 1919. (Boards, 184 pages, 6 by 9½ inches.)

The second edition, revised and enlarged, of a text book of the Harvey Frost process of vulcanization applied to the repair of motor tires. It contains chapters written by experts covering every application of the process. Preliminary hints are given on undertaking repairs, and tube and cover repairs are exhaustively treated. There is an informative chapter on "The Care of Tyres" which includes standard inflation tables, etc. Condensed instructions in French and also in Spanish are a feature of the volume.

CHEMICAL ENGINEERING CATALOG, 1920. FIFTH ANNUAL EDItion. The Chemical Catalog Co., New York. (Cloth, 1,450 pages, 9 by 12 inches.)

This valuable collection of chemical engineering data is published annually under the supervision of an official committee appointed by the American Institute of Chemical Engineers, the American Chemical Society and the Society of Chemical Industry.

The work covers every division of the broad field of the chemical industries, the information being presented as follows: (1) by condensed and standardized catalog data of equipment, machinery, laboratory supplies, heavy and fine chemicals and raw materials used in the industries employing chemical processes of manufacture; (2) a general directory of such equipment and materials, classified and cross-indexed; (3) a technical and scientific book section, cataloging and briefly describing a practically complete list of books in English on chemical and related subjects.

NEW TRADE PUBLICATIONS

The Peachy Process Co., Limited, 40 Gerard Street, London, W. 1, has recently issued a pamphlet covering matters relating to the capitalization of the company; the chief advantages of the Peachey process of cold vulcanization; a short biography of the inventor; and separate reports by Dr. Henry P. Stevens and Frederick Kaye on the technical value of the process and validity of the patents. These are followed by a brief historical review of Goodyear's hot vulcanization process and a statement of its drawbacks.

The Eagle-Picher Lead Company has issued a 16-page booklet listing the lead products which it manufactures, many of them being used largely in the rubber industry. The booklet is illustrated with half-tone illustrations of the various Eagle-Picher plants, and includes a graph showing the derivatives of lead.

At the Chemical Exposition recently held in New York City, the Buffalo Foundry & Machine Co., Buffalo, New York, distributed a booklet covering some recent developments in vacuum dryers, evaporators, vacuum pans, chemical equipment, etc. Many manufacturers of rubber goods are well acquainted with the "Buflovak" line of equipment and will be interested in its newer developments.

The National Aniline & Chemical Co., Inc., New York City, manufacturer of dyestuffs and miscellaneous coal tar products, has issued a handsome 24-page illustrated booklet containing a very readable brief history of the development of the American dyestuff industry, showing the important place this firm occupies in that field and presenting much information regarding its service and products for the treatment of textiles and rubber. The list of intermediates and other coal tar derivatives includes several accelerators, notably aniline oil and thiocarbanilide, much used in rubber manufacture.

"Carspring," the latest catalog of belting and cotton rubber-lined fire hose, published by the New Jersey Car Spring & Rubber Co., Inc., Jersey City, New Jersey, serves for a reference book as well as a catalog. It includes a technical discussion in regard to the construction of belts, together with data compiled from a series of tests made at Stevens Institute of Technology, Hoboken, New Jersey, and offers in handy form some valuable information for plant engineers and students of belting efficiency. The booklet is attractively printed in two colors and is adequately illustrated.

The illustrated catalog of the Davol Rubber Co., Providence, Rhode Island, is said to present the most complete line of druggists' sundries, hospital and stationers' rubber goods on the market today. It is printed on fine quality paper, profusely illustrated with cuts in color and black and white, and will be found by the buyer superior in many respects to a line of samples.

An attractive folder entitled "The A B C's of Refrigeration," issued by The Technical Products Co., 501 Fifth avenue, New York City, describes under the caption "The Technical Way" the high speed vertical single acting ring plate valve compressors which this company is handling. The Technical Products Co. deals in new and used equipment, the latter comprising large purchases from Government munitions plants.

A new publication, of which Volume I, Number 1, has just come to the Editor's desk, is *The Planter*, an illustrated monthly paper, official journal of The Incorporated Society of Planters, and published by them at Kuala Lumpur, Federated Malay States. As is but natural, the magazine is devoted mostly to rubber culture and its constant problems and activities, but its lighter side shows the characteristic trait of the Englishman to take his sports and his jests with him wherever he goes. The August issue contains among others, articles on "The Future of Rubber," "Brown Bast—the Mystery Still Unsolved," and "Sugar in Malaya." We wish success to *The Planter*.

"Commercial Vehicles of Great Britain, Volume II, 1920," published by The B. F. Goodrich Co., Limited, London, England, contains complete specifications of various types of trucks, char-a-bancs, etc., arranged to be of great value to manufacturers, dealers and users of commercial vehicles. Upwards of a hundred types of vehicles are considered, ranging from ½ to 6 tons normal capacity, or to 10 tons when used with trailer.

Analysis of the various tire sizes used shows that out of six 1½-ton trucks considered, three preferred front tires measuring 860 by 90 mm. single (or 90 to 720 mm. rim), while three also agreed upon rear tires 860 by 90 mm. twin. In 2-ton trucks six out of twelve analyzed called for front tires 870 by 100 mm. or 100 for 720 rims single, and rear tires twin of same dimensions. The same dimensions of tires were also popular with four out of seven 2½-ton trucks analyzed. Three-ton trucks showed more diversity in tire sizes, five out of seventeen using front tires 900 by 120 mm. or 120 for 720 mm. rims, while only two used the same rear tire size, 103 by 140 or 140 for 851 twin. Three 3½-ton commercial vehicles used front and rear tires the same size, 930 by 120 mm. or 120 for 771-mm. rims, the remainder of the eleven analyzed calling for many different tire sizes. Among the 4-ton trucks, tire sizes varied still more, three preferring front tires 900 by 130 mm. or 130 for 720 rims, and two each front tires 900 by 120 or 120 for 770 rims, and 880 by 120 or 120 for 720-mm. rims. Rear tires 1,010 by 120 mm. or 120 for 850 were chosen by two 4-ton trucks, while two others agreed upon 1,050 by 120 or 120 for 881.

The others among the nineteen 4-ton trucks analyzed showed wide variations. Among eighteen types of 5-ton trucks there was more uniformity. Three each used front tires 900 by 160 or 160, for 720-mm. rims, and 880 by 120 or 120 for 720-mm. rims. For rear tires five used 1,050 by 160 twin or 160 for 850, and four used 1,030 by 140 twin or 140 for 850. Out of five 6-ton vehicles two used front tires 970 by 160 or 160 for 771 and rear tires 1,050 by 160 or 160 for 850-mm. rims.

Goodrich tires are made in millimeter sizes as well as in inches as used in America, and are in great demand for British-made vehicles.

Other subjects of interest treated in the booklet are: A Standard for Recording the Operating Costs of Commercial Vehicles, Lengthening the Life of the Motor Vehicle, Fifteen Helpful Suggestions for the Fitting and Detaching of Solid Band Tires, and Weights of Materials Commonly Hauled by Commercial Vehicles.

"Markets of the World," published by the First National Bank of Boston, Massachusetts, comprises a series of economic maps and statistical abstracts of the principal countries of the world. The book, which is entirely original in character, has been compiled by H. A. Lyon of the bank's commercial service department and is tastefully and conveniently bound in loose-leaf form with black cloth covers stamped in gold. Owing to the special value of the volume to organizations devoted to foreign trade it has not been prepared for general distribution.

THE OBITUARY RECORD

VICE-PRESIDENT OF THE UNITED STATES RUBBER COMPANY

Elisha Slade Converse Williams, vice-president in charge of the mechanical goods division and a director of the United States Rubber Co., New York, died October 8, at the Ossining Hospital, Ossining, N. Y., aged 47 years. His death was a great shock and a profound sorrow to the host of friends both in and out of the organization, who knew and loved Mr. Williams. Funeral services at the Funeral Church, Broadway and Sixty-sixth street, New York City, were conducted by the Rev. George Caleb Moor, pastor of the Madison Avenue Baptist Church. Burial was made at Malden, Massachusetts, which was Mr. Williams' former home.

Elisha S. Williams

Mr. Williams was born in 1873, and, a namesake of the late Elisha S. Converse, began his career in the rubber industry in 1891 with the Revere Rubber Co., Chelsea, Massachusetts. He was associated with this firm in various capacities, including those of treasurer and general manager, becoming a practical rubber manufacturer of exceptional executive ability. Under his management the firm's annual output reached $6,000,000 in 1909, when the business was taken over by the United States Rubber Co.

Thereafter Mr. Williams was an important factor in the successful growth of the United States Rubber Co. and its subsidiaries. In 1910 he became president, a director and member of the executive committee of the Rubber Goods Manufacturing Co., following the death of Charles H. Dale; a director and member of the executive committee of the United States Rubber Co.; a director and member of the executive committee of the General Rubber Co., and president of the Revere Rubber Co. Since that time he has held several official positions in a number of affiliated companies of the Rubber Goods Manufacturing Co., including the presidencies of the Mechanical Rubber Co. and the Hartford Rubber Works Co. He was also a director of the American Commerce Co. and the Eureka Fire Hose Manufacturing Co.

In 1911 Mr. Williams was instrumental in organizing the United States Tire Co., of which he was made president, to market its entire production. The same year he went to Europe and laid the foundation for the company's export tire trade. In 1915 he resigned this office to devote his exclusive attention to the mechanical rubber business of the United States Rubber Co., of which he had for several years been in charge.

As a member and for ten years a director of The Rubber Association of America, Mr. Williams was prominent in its constructive work. When the War Service Committee of the Rubber Industry was organized early in 1918, to act as a point of contact between the industry and the Government, Mr. Williams was appointed chairman of the mechanical goods commercial division, and under his leadership important recommendations were made tending toward much needed standardization in this line of goods. He was a member of the New York Athletic, Metropolitan, Union League and other New York clubs.

Mr. Williams was a keen judge of men, a natural organizer, a business man to the core, yet possessed of a genuine but quiet friendliness. His passing brings wide-spread sorrow.

ALBERT STEIN

Albert Stein, 54 years old, president and founder of A. Stein & Co., manufacturers of elastic goods in Chicago, New York and Toronto, died last month of pneumonia. Mr. Stein, who was born in 1866 in Germany, came to this country in 1884, and three years later started business in Chicago.

RUBBER TRADE INQUIRIES

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The editor is therefore glad to have those interested communicate with him.

(829) A manufacturer desires the address of a company that regrinds calender rolls in the factory.

(830) A correspondent asks where he can obtain "Glugloss gelatin" in small quantities for investigative work in waterproofing fabrics.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS

Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from the following district or cooperative offices. Requests for each address should be on a separate sheet, and state number:

District Offices	Cooperative Offices
New York: 734 Customhouse.	Cleveland: Chamber of Commerce.
Boston: 1801 Customhouse.	Cincinnati: Chamber of Commerce; General Freight Agent, Southern Railway, 96 Ingalls Building.
Chicago: 504 Federal Building.	Los Angeles: Chamber of Commerce.
St. Louis: 402 Third National Bank Building.	Philadelphia: Chamber of Commerce.
New Orleans: 1020 Hibernia Bank Building.	Portland, Oregon: Chamber of Commerce.
San Francisco: 307 Customhouse.	Dayton, Ohio: Dayton Chamber of Commerce.
Seattle: 848 Henry Building.	

(33,795) A merchant in Ceylon desires to purchase bicycle tires and inner tubes. Quote c. i. f. Ceylon port.

(33,819) An American firm which is the representative of a manufacturer's agent in Colombia desires to get into communication with firms for the sale in that country of elastic webbing.

(33,829) The representative in the United States of a manufacturers' agent in Colombia desires to secure an agency for the sale of household and pharmaceutical rubber goods.

(33,834) A commercial agent in Chile wishes to purchase rubber overshoes from manufacturers.

(33,838) An import and export agent in Jugoslavia desires to establish commercial relations with firms handling rubber goods. Correspondence may be in English.

(33,839) An industrial firm in Belgium desires to secure the agency for the sale of balata belting, and all industrial articles for the manufacture of rubber goods, waterproof fabrics, etc. Cash against documents.

(33,843) The representative of a merchant in Haiti is in the

United States and desires to secure an agency for the sale of second-hand automobile tires.

(33,866) A commercial agent in Brazil desires to represent firms exporting industrial and pharmaceutical rubber goods. Quote c. i. f. Brazilian port or f. o. b. American port. Terms, 60 and 90 days' draft. Correspondence may be in English.

(33,867) A commercial agent in Brazil is in the market for automobiles, trucks and rubber goods. Quote c. i. f. Brazilian or f. o. b. American ports. Terms, 60 and 90 days' drafts. Correspondence may be in English.

THE FIRESTONE ESSAY SCHOLARSHIP

In a competition that centered the thoughts of more than 200,000 high school students, their relatives and friends, upon good roads problems, which will be theirs to solve within the next few years, 16-year-old Katharine Flournoy Butterfield, of Weiser, Idaho, won the Harvey S. Firestone university scholarship for the best 500-word essay written in the Ship by Truck-Good Roads essay contest recently concluded.

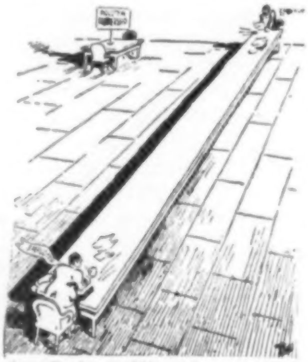
School children from every state in the Union competed under the supervision of educational authorities. The best essays were winnowed out by a process of elimination through city and state committees until the national committee, which sat in Washington, had before it only one essay from each state.

The contest and prize was announced during National Ship by Truck-Good Roads Week last May and was part of Mr. Firestone's contribution to its success. So great was the interest aroused by this effort to turn the thoughts of thousands of young people to one of the nation's greatest problems that motor companies, newspapers, magazine publishers and automotive associations gave hundreds of city and state prizes.

R. J. CALDWELL CO., INC., MANUFACTURERS OF TIRE FABRICS, 15 PARK ROW, New York City, has sent out a paperweight souvenir that has more weight than the heavy plate glass of which it is made. It is backed by two pertinent cartoons suggesting in-

Dispatch, Columbus, Ohio

A STORY WITHOUT WORDS



Star, St. Louis, Missouri

WHY NOT SIT AT THE SMALL TABLE

dustrial partnership and better cooperation between labor and employer, and on the reverse carries a few paragraphs by Mr. Caldwell on "Mutual Good Will," reprinted from *The Survey*. Such a reminder on one's desk, constantly giving out its good-natured silent message, probably has more psychological effect than many soap-box speeches.

FOR THE EIGHT MONTHS JANUARY TO AUGUST, 1920, THE VALUE of rubber exports from London to the United States was $30,242,036, as against $9,744,511 for the same period in 1919. Exports of rubber in July, 1920, were $1,069,184 and decreased in August, 1920, to $590,005.

BRAKE INSPECTION DEMANDED

Vice-President F. S. Wilson of the Thermoid Rubber Company, Trenton, New Jersey, and San Francisco branch manager of that concern, certainly "started something" when, in a vigorous address at the recent convention in San Francisco of the National Traffic Officers Association, he emphasized the importance of having automobile brakes officially and systematically inspected. Already plans are being made for securing legislation for the purpose in California, and the indications are that it will not be long before most of the other forty-seven states in the Union will enact laws along the lines suggested. The traffic officers of the country and the accident insurance companies can be depended upon to exert their influence toward getting the desired legislation, and public sentiment in favor of all "safety first" measures will aid the movement powerfully.

It was pointed out by Mr. Wilson that while the brakes on steam and electric railroad cars and on all factory, warehouse, and office building elevators are set up according to strict government specifications and are regularly inspected, there appears to be no effort made in any part of the country to apply the same safeguard to motor cars, which so tremendously outnumber the 150,000 elevators in the United States and rival in number the railroad cars of the country.

Mr. Wilson submitted statistics showing a remarkable reduction in the number of steam railroad accidents since Congress in 1893 passed the law standardizing braking equipment and requiring periodical inspection. He predicted a correspondingly great decrease in automobile accidents (85 per cent of which are due to poor or misused brakes) if braking apparatus be regulated properly by law. As an instance of the universal need of such regulation he cited the fact that in a recent test on numerous motor cars in the city of Oakland, 25 per cent of the brakes on the cars showed a practically worthless and potentially dangerous condition.

STATEMENT OF THE INDIA RUBBER WORLD

Statement of the ownership, management, etc., required by the Act of Congress of August 24, 1912, of THE INDIA RUBBER WORLD, published monthly at New York, New York, for October 1, 1920.

State of New York, }
County of New York. } ss.:

Before me, a notary public in and for the State and county aforesaid, personally appeared E. M. Hoag, who, having been duly sworn according to law, deposes and says that she is the business manager of THE INDIA RUBBER WORLD, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The India Rubber Publishing Co., 25 West Forty-fifth street, New York City.

Editor, Henry C. Pearson, 25 West Forty-fifth street, New York City.

Managing Editor, Henry C. Pearson, 25 West Forty-fifth street, New York City.

Business manager, E. M. Hoag, 25 West Forty-fifth street, New York City.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

Henry C. Pearson, 25 West Forty-fifth street, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

E. M. HOAG, Business Manager.

Sworn to and subscribed before me this 29th day of September, 1920.

[SEAL] FREDK. SPRENGER,
Notary Public, Westchester County.
Certificate filed in New York County.
New York County Clerk No. 188. Register's No. 2210.
(My commission expires March 30, 1922.)

The Rubber Trade in Great Britain

By Our Regular Correspondent

The topic of the day is the low level to which raw rubber has fallen, a level which has confounded the prediction made by experts a year ago that the price would go to three shillings per pound on the resumption of Continental buying. There is no need to say that the course of trade events in America, in conjunction with the Continental exchanges, has been the chief causes of the slump. The position is sufficiently patent to those who are really interested or concerned. Moreover, it is not the rubber manufacturer but rather the plantation shareholder who is adversely affected by the slump in American tire manufacture and the reselling of raw rubber bought by America. It is the large increase in London stocks which is causing concern, and much advice is being tendered to the plantation authorities as to the necessity for an immediate curtailment of output.

In view of the present state of affairs it is somewhat surprising that the pressure to realize share holdings has not been more pronounced, and it may be taken to indicate a feeling that ultimate recovery is certain. The threatened surplus of about 40,000 tons at the end of 1920 has, of course, caused the Rubber Growers' Association much concern and it is not surprising that at the council meeting on September 24 it was decided to recommend that all producers effect a genuine reduction of 25 per cent of their estimated normal monthly output. Warehouse accommodations being among the questions involved it is a logical argument that the trees provide by far the best storage until the commodity can be absorbed by the trade. Naturally, consumers do not view the situation through the same glasses as the growers, and complaints are appearing in the press about the deliberate and combined attempts to keep up the price of rubber to the disadvantage of the motorist. It is averred that Stock Exchange manipulation is back of the rubber growers' move. Well, I suppose it is, as the rubber growers' shares are dealt with on the Stock Exchange.

THE RESEARCH ASSOCIATION OF BRITISH RUBBER TIRE MANUFACTURERS

The announcement has just been made that the Board of Management has selected J. D. Fry, M. Sc., of Bristol University, to assist the director of research, B. D. Porritt, in the important investigations in connection with the physical properties of rubber which are already under consideration. Mr. Fry was educated at the Merchant Venturers' College, Bristol, and at Bristol University, of which he is a graduate. He subsequently received an appointment on the staff of the University as lecturer in physics, with sole charge of the junior physical laboratories. In addition to designing much of the intricate apparatus used for the experimental work of his department, including an ingenious instrument for measuring minute gas pressures, he has published numerous papers on a variety of scientific subjects. At the outbreak of war he volunteered his service in the capacity of quartermaster and radiographer in connection with Lady Paget's Hospital Unit, which he accompanied through the Serbian campaign, being awarded the Serbian Royal Red Cross and the Serbian Charity Cross decorations. On his return from Serbia he was appointed to take charge of the radiographic department of the Welsh Metropolitan War Hospital, and in connection with his work there he devised a rapid method of locating foreign bodies without the use of photographic plates and also a skin marker which has been widely adopted.

In 1916 the difficult problems arising in connection with balloon fabric rendered it necessary for the R. N. A. S. to seek the services of a competent physicist, and Mr. Fry was appointed senior research officer of the Research Staff. From this date until the termination of hostilities Mr. Fry was occupied in investigating the many intricate questions arising in the manufacture, testing and use of balloon fabric, more especially in connection with the action of light on the physical properties of rubber. I understand that Mr. Fry has already entered upon his new duties, and the Research Association is to be congratulated on having secured the services of a man who is not only a sound scientist and skilful experimenter but who combines a considerable insight into the peculiar problems of the rubber industry.

DUNLOP RUBBER CO., LIMITED

A financial paper in commenting on the recent increase in the Dunlop Rubber Company's capital to £20,000,000 confessed that it was getting somewhat bewildered by Dunlop finance. Although not yet on the scale of Lever Brothers' finance, the figures keep steadily mounting. What with works in Birmingham, France and America, cotton mills in Lancashire, and rubber estates in the East, there has indeed been a startling progress since the days of Byrne Brothers at Birmingham. The increase of capital has been effected by the creation of 12,500,000 additional ordinary £1-shares. Some £7,500,000, representing premiums received on shares and undistributed profits, is to be distributed as a bonus to shareholders in the proportion of three to one. Of the balance, 3,000,000 is to be offered to existing holders of shares at the price of £1.10.0 per share. The financial position certainly seems very satisfactory, showing a considerable increase on the previous year.

LEYLAND & BIRMINGHAM RUBBER CO.

The trading profit of this company for the past year shows a decline of £4,700, as compared with the high level of 1918-19, but as a larger sum was brought forward and it is not thought necessary to devote so much to depreciation, bad and doubtful debts, etc., the sum actually available is larger. The dividend is 15 per cent for the fifth successive year, but it is payable now upon a larger capital, although the 125,000 shares issued last April do not participate in it. No allocation is made to reserve this year.

J. Mandleberg Co., Limited, has declared an interim dividend for the first half of 1920 at the rate of 10 per cent on the ordinary shares up to 300,000. The recently created capital does not share in the above declaration.

SHORTAGE OF CAMPHOR

The present world shortage of camphor threatens to create a serious position in Sheffield, where its use in celluloid for making knife handles and razor hafts has developed ten-fold in the last fifteen years. Sheffield's yearly requirements of celluloid are now estimated at between 400 and 500 tons, representing half a million sterling in value, and millions of dozens of celluloid handles, scales, etc., are on order to provide for the cutlery output of the next six to twelve months. This situation obviously presents an opportunity for hard rubber manufacturers.

NO NOTICE OF DISMISSAL

A rather important case was recently before the Manchester stipendiary magistrate in which a rubber worker who had been discharged without notice sued the firm for a week's wages. The firm's solicitor said that the usual custom in the rubber trade was that no notice was given on either side. The magistrate expressed surprise at this and adjourned the case for the firm to bring evidence supporting this statement. At the resumption of the case witnesses from three firms testified as to it being the custom not to give or require notice, although in none of the works was there any notice posted up to this effect. On this evidence the plaintiff's claim was dismissed. The result of the case has been that some of the rubber works have put up prominent

notices to the effect that no notice is given or required. This summary procedure, which is by no means common in our industries generally, seems to have had its origin in the tendency of a workman under a week's notice to go back or possibly to do damage to a serious amount. It is the few black sheep among the hands that have caused manufacturers to apply this rule to workmen generally.

NEWS NOTES

In a recent British report on progress in the chemistry of oils and fats I read that a new use for lead oleate is reported from the United States, where it has been used successfully to prevent tackiness in manufacturing rubber goods. It is further stated that the consumption for this purpose amounts to about one million pounds a year. I do not remember seeing any reference to this in rubber technical literature. The lead soap takes the place of the ordinary soap which is used by the web mixers in preparing the dough in proofing works.

The writer recently had the pleasure of a call from John Young, chief chemist of the Firestone Tire & Rubber Co., Akron, Ohio, and allowed him to depart without the ordeal of an "interview" on the general conditions of the American rubber trade. On the scientific side Mr. Young was informative on the continuous progress which is being made in American works in the way of laboratory equipment.

A good index of the extent to which sponge rubber manufacture has attained is the large amount of waste now arriving at the reclaimers' premises. This does not consist of individual sponges collected from bath rooms but of factory clippings. Sponge rubber is not limited to its original use but is employed for making a variety of rubber goods, hence the increased volume of waste available.

A business meeting to be followed by a luncheon is to be held at the Queen's Hotel, Manchester, on October 8, in connection with the proposed Rubber Club. It is reported that the initiation of the club is progressing satisfactorily, though from what I hear in the trade there is likely to be considerable opposition to the proposal that agents, travelers, holders of junior posts in works, etc., shall be eligible for membership. In fact, the fixing of a datum line as to eligibility seems likely to prove a difficult matter.

At a recent Government auction of boots all the leather qualities went off easily, while no satisfactory bid was obtained for the rubber boots and galoshes. I suppose buyers were afraid of having them left on their hands, as rubber footwear has not really made much progress in this country in popular estimation.

Walter Wild has severed his connection with the Victory Rubber Co., Leyland, maker of rubber fiber boot soles.

S. J. Peachey is to read a paper on his cold vulcanizing process at the Manchester Section of the Society of Chemical Industry in November.

Horsfall & Bickham, Limited,, Pendleton, Manchester, maker of rubber-faced and composition card clothing, has just completed a large extension to its wire-drawing department and made other alterations to the works, which were founded in 1835. H. H. Worthington is the chairman of directors and P. C. Briggs managing director. There are several firms in Yorkshire which buy card cloth foundations, card and reed wire steel points, etc., from the few manufacturers who do the whole of the processes, and then they assemble the parts into the finished article. Probably there are not as many as half a dozen works in England where the whole process of wire drawing and rubber manufacture is carried on by the same firm.

The American Chamber of Commerce in London is advised by its Automobile Section to remind American exporters, not only of automobile accessories but in all lines of trade, that American trade-marked articles coming into Great Britain must bear the words "Made in U. S. A.," or equivalent indication of the country of origin.

RUBBER GROWERS PLAN TO RESTRICT OUTPUT

Anticipating a large increase in the demand for tires and other rubber goods, the Americans were heavy crude rubber buyers last autumn and in the early months of this year, and as it turns out, the rubber mills have over-manufactured. Transportation difficulties, the limitation of credits and failure of anticipated tire demands, however, beset manufacturers who now hold unusual stocks. We have learned that work forces are greatly reduced in American factories.

The position is much the same in this country. High taxation—especially the increase in excess profits duty—and labor unrest have created uncertainty and thereby limited development. It is unlikely that British manufacturers will take as much crude rubber in 1920 as they did in 1919, and the deficiency may reach, if it does not exceed 10,000 tons. Nor can it be said that the immediate prospects are encouraging. The increased tax on motor cars which will come into operation on January 1, 1921, and the high cost of motor spirit will reduce the use of motor cars, curb development in motor traction and lessen the demand for tires.

The Rubber Growers Association has given the matter serious consideration and has given the Output Control Committee instructions to submit a plan for restriction of crude rubber output. It appears, however, that the situation is now worse than it was in the early part of 1918, when the previous restriction plan was adopted by the Association. Then, about 70 per cent of the acreage represented by the Association restricted production. Not only 30 per cent of membership, but also the local companies of the East and the Dutch interests withheld support. The plan was therefore only a partial success, but it eventually had a most beneficial effect upon the markets.

Entirely different conditions now prevail. As a result of the previous restriction scheme there are now a number of strong producers' associations. The Association of Singapore is a strong body in good hands, and there was formed last May a Chinese Planters' Association. Quite a large area is Chinese-owned. The serious position which has arisen appears to be realized in the East, and telegrams have been sent from prominent agents in Malaya urging restriction.

While the extent of the restriction is not yet known, it is understood that the proposal is to restrict output during the months of October, November and December, and to continue the restriction in a modified form during 1921, or until the present stocks are brought within reasonable limits. An examination of the crops return for the month of August indicates that very large producing companies have followed the advice of the association in the adoption of the alternate-day tapping. It is made clear that there is no occasion for panic, as companies whose directors have sold forward at prices current early in the year will still have a fair average. The matter, however, demands immediate attention and the application of the only possible remedy.

THE RUBBER TRADE IN GERMANY

By a Special Correspondent

THE LEIPSIG FAIR

One of the leading indicators of industrial prosperity in Germany is always the Leipsig Fair. From the attention which this large wholesale market finds among German and foreign buyers an impression may be gained of the state of the German business during the next six months until a new Leipsig Fair lays the foundation for the coming half year. The German rubber industry is interested in two sections of the Leipsig Fair, the so-called technical fair and the general sample fair which follows the first. It may be said that the present autumn fair has been somewhat of a disappointment for manufacturers and buyers alike. But the trouble lies deeper than may be expected from the actual

decrease in business that was done during the fair. The failure of the last fair in fact has its foundation in the occurrences of last year's autumn fair. The German manufacturers, including the rubber manufacturers, went to this fair with very high hopes. They had just passed over the most serious part of the after the war period, the first year of peace, and were ready to do business as before. The foreign buyers were most amenable and the Leipsig Fair was well visited by them. The sales were fairly large, because of the cheap prices offered by the Germans and also owing to the very favorable exchange to the foreign buyer. But the German manufacturers apparently spoiled the success of this first beginning of international trading by not coming up to their promises.

First, the Germans did not keep their promises as to date of delivery. This might have been excused on account of minor revolutions and labor difficulties. Neither England nor France has been able to hold her delivery dates. But the Germans, seeing the market going against them also, failed to keep their promises as to prices. When the exchange value of the mark went down the German manufacturers tried to evade their contracts. In some cases where marks had been quoted and the order accepted, they attempted to substitute dollar or another quotation for marks, and declined to ship unless the buyer agreed to what amounted practically to a hold up. The buyers in consequence suffered great losses and the Germans sacrificed many customers that had remained loyal to them even during the war.

When this year's autumn fair arrived the foreign buyers positively stated that they would not place any orders unless the Germans would undertake to fill them and stick to their promises. Whether this discouraged exhibitors or whether the foreign buyers did not care to place orders under any conditions, it is sufficient to say that the expected business was not realized.

Passing over the business aspects of the last fair, there was a good deal of interest connected with it from the economic point of view. To deal first with the technical fair, the most surprising fact confronting the foreign visitor was the great number of exhibitors and incidentally the nervous temper displayed by the exhibitors. Germany has gone through a technical boom, if a boom be the formation of many firms manufacturing technical articles, including such made from rubber. The impression seems to have gone round in Germany that the country is in urgent want of technical equipment and a great many enterprises have, therefore, centered their activities upon manufacturing such equipment of various sorts. With the comparatively small quantities of raw materials on hand the new firms are finding life very difficult and, having no foreign markets to speak of at the present time, they all have tried to sell to the German consumer, who naturally was soon fed up with this oversupply. The German industry after having once started its machinery and paid heavily during that period for industrial equipment has now become a very careful purchaser.

Nearly all manufacturers of mechanical rubber goods have been compelled to reduce prices. These prices are still far above the 1914 levels but the tendency to lower them is very pronounced and it is time that the competitors of Germany in this field should wake up to the fact that consistent attempts are being made to bring down prices at any cost. Rubber hose, hard rubber goods and many other rubber goods have been marked down, and the promise is made that prices will decline still further if German foreign exchange is again normalized. The German rubber industry has been especially adept in changing from unprofitable products to those for which there is a large demand. Hence one finds hard rubber factories suddenly turning to jar rings. Insulation materials are still in good demand and there is a large business done in rubber gloves. The German mechanical rubber goods industry seems to have realized that during the next few years rubber will be used for many articles for which there was comparatively little demand in the past. Brake linings for horse drawn cars, for instance, have been borrowed from the automobile designers. The brewing industry, which has been kept in very strict limits during the war, is now recovering again and with it comes a very heavy demand for bottle rings, spiral hose condensor rings and a great many other rubber articles. Also the belting industry is busy bringing out many novelties.

The technical fair gave opportunity for showing goods used in other industries. For instance, wringing machine rollers, hard rubber tubes for fountain pens and similar articles. The rubber manufacturers are of opinion that they will have to show these articles to remind the buyers of their existence even if the demand should still be very small. There has been a good demand for rubber made parts from foreign sources, which shows that foreign manufacturers are inclined to make use of German parts even if they should prefer to do the work of assembling in their own factories outside of Germany.

The conditions during the sample fair were very similar to those during the technical fair. The foreign demand was comparatively small and the business suffered from the fact that the German makers being apprehensive about delivery were inclined to err on the other side by asking long delivery periods. As the result a large percentage of all business was done for next year's delivery. Sport articles, of course, are always sold during the autumn fair for delivery at the beginning of the following summer. But it seems that even rubber shoes were ordered for delivery only during the winter of 1921, which seems an unusually long term. The demand for rubber soles and heels is now increasing again after having declined severely during the summer. The growth in the German automobile business was reflected by larger orders for rubber matting, rubber sponges, auto horn bulbs and similar articles. There is of course always a certain demand for house and kitchen articles and the sale of druggist's sundries has remained good ever since the ending of the war. Novelties in orthopedic articles are selling well at the present time in Germany and a careful reader of the German patent reports can notice that the wave of surgical inventions has not come to an end with the war. Artificial limbs are still much in demand and improvements are made practically every day. Germany has developed in recent years a special industry for the supply of office articles. These, including erasers, fountain pens, rulers, etc., were all offered during the fair and sold in normal quantities. The demand for rubber combs and other similar articles of hard rubber still seems to be below normal.

NEW RUBBER FIRMS

Thieme & Co. G.m.b.H., Dresden. Manufacture and sale of rubber goods.

Haka Pannenlose Gummibereifung G.m.b.H., Chemnitz. Manufacture and sale of tire covers for automobiles, motorcycles and bicycles.

Excella Filler Pen Co. G.m.b.H., Neukoelln. Manufacture of fountain pens, penholders, pencil holders and other hard rubber goods.

Frankfurter Gummihandelsgesellschaft m.b.H., Schaalmann & Co., Frankfurt a.M. Sale of rubber goods.

Dresdo Gummiwaren G.m.b.H., Dresden. Manufacture of rubber goods.

Gummiwerke Genthin G.m.b.H., Genthin. Manufacture of rubber goods and rubber substitutes.

M. and W. Polack, Merseburg. Manufacture of Polack solid tires. Owners, Max Polack and Werner Polack. Max Polack is known as the founder of the well known B. Polack Gummiwarenfabrik and the B. Polack Aktiengesellschaft at Waltershausen in Germany. Werner Polack is the son of the above. He is known also in the United States, where he was formerly engaged in the tire branch of the rubber industry.

Recent Patents Relating to Rubber

THE UNITED STATES

ISSUED AUGUST 24, 1920

NO. 1,350,332 Rubber heel. J. R. Pettit, New York City.

1,350,412 Clip for fountain-pen caps or the like. D. J. La France, Cambridge, and W. P. De Witt, Somerville, both in Massachusetts, assignors by mesne assignments to De Witt-La France Co., a Massachusetts corporation.

1,350,414 Inflatable hydraulic air-cushion. J. D. Langdon, Waterville, Wash.

1,350,467 Pneumatic-tire drive for dynamos of railway cars. E. Posson, Chicago, Ill.

1,350,571 Phonograph motor with rubber wheel. W. G. Shelton, New York City. (Original application divided.)

1,350,712 Bonnet or cap with elastic drawstrings. J. G. Dupont, Chicago, Ill.

1,350,719 Eye syringe and massage device. E. H. Galligan, Providence, R. I.

1,350,751 Windshield cleaner. E. A. Tverdahl, Evanston, Ill.

1,350,767 Stethoscope. F. C. Aschburner, Chicago, Ill.

1,350,776 Bathing hat. J. T. Brogden, assignor to Revere Rubber Co.—both of Providence, R. I.

1,350,813 Convertible wheel rim to engage a rail and a tire simultaneously. E. L. Keesling, San Jose, Calif.

1,350,926 Air pump for inflating pneumatic tires. J. M. E. Franc, Andancette, France.

1,350,930 Rubber shoe-bottom. W. Macpherson, Cambridge, Mass.

1,350,935 Toy balloon with valve. F. Pastor, Akron, assignor to the Anchor Rubber Co., Barberton—both in Ohio.

1,350,950 Life-saving suit. J. Talos, Akron, O.

1,350,995 Vehicle tire. H. E. Grabau, Long Island City, assignor to A. C. Schwartz, New York City—both in New York.

ISSUED AUGUST 31, 1920

1,351,015 Tire casing. A. V. Anderson and A. M. Morgan, assignors to Ford Tire & Rubber Co.—all of Fort Worth, Tex.

1,351,052 Metal vehicle wheel for tires. C. Macbeth, Birmingham, assignor to The Dunlop Rubber Company, Limited, Westminster, London—both in England.

1,351,130 Measuring instrument. A. Roesch, assignor to Charles A. Taglinbue Manufacturing Co.—both of Brooklyn, New York.

1,351,145 Golf ball. G. C. Worthington and W. E. Reichard, assignors to Worthington Ball Co.—all of Elyria, Ohio.

1,351,166 Mattress with waterproof insert. E. E. Gundlach, Madison, Wis.

1,351,183 Demountable split rim for tires. J. C. Manternach and C. W. Gressle, assignors by mesne assignments to The Standard Parts Co.—all of Cleveland, O.

1,351,218 Windshield cleaner. O. C. Ritz-Woller, Chicago, Ill.

1,351,237 Whistling pressure gage for pneumatic tires. A. G. Ewing, Los Angeles, Calif.

1,351,250 Rubber-set riffle. J. Horn, Kelvin, Ariz.

1,351,291 Rubber shoe sole having central longitudinal ridge on upper side. F. Hornquist, Mount Jewett, Pa.

1,351,301 Airship with spaced ballonets divided into hydrogen and air chambers. V. Pritelli, Rome, Italy.

1,351,328 Cap for nursing bottles and the like. W. M. Decker, Buffalo, N. Y.

1,351,400 Valve for pneumatic tires. B. Pangrazio, Scottsville, N. Y.

1,351,463 Tire casing and method of manufacture. N. Benjamin, Elmira, N. Y.

1,351,480 Pneumatic or compressed-air-cushion bed. R. A. Leigh, assignor to E. F. Leigh—both of Denver, Colo.

1,351,496 Jar closure with rubber washer. C. H. Spooner, Charlestown, N. H.

1,351,543 Skeleton shoe heel with filling of rubber. A. Santacroce, Cleveland, O.

1,351,567 Garter. R. Gorton, Brookline, Massachusetts; C. W. Noyes, administrator of said R. Gorton, deceased.

1,351,574 Fountain pen. C. R. Keeran, Chicago, Illinois, assignor by mesne assignments to The Wahl Co., Wilmington, Del.

1,351,575 Fountain pen. C. R. Keeran, Chicago, Ill., assignor by mesne assignments to The Wahl Co., Wilmington, Del.

1,351,587 Demountable rim for tires. J. Stungo, New York City.

1,351,591 Fountain pen. J. C. Wahl, Chicago, Ill., assignor by mesne assignments to The Wahl Co., Wilmington, Del.

1,351,691 Rubber resilient heel or lift. H. C. Ridout, Bournemouth, England.

ISSUED SEPTEMBER 7, 1920

1,351,862 Squeegee. J. H. Menkhaus, Cincinnati, O.

1,351,873 Fountain pen. P. P. Sanford, Woodridge, N. Y.

1,351,894 Resilient core for tires. J. H. Dalbey, assignor to Elgin Rubber Ace Co.—both of Elgin, Ill.

1,351,917 Aseptic appliance with rubber tube. A. O. Kuhn, San Francisco, Calif.

1,351,982 Rubber garment-protector made of flat blank with suitable openings shirred and cemented to strips of rubber. M. Zwicke, assignor to I. B. Kleinert Rubber Co.—both of New York City.

1,352,008 Rubber shoe and method of making the same. George L. Lawrence, Jr., Melrose, assignor to Boston Rubber Shoe Co., Malden—both in Massachusetts.

1,352,047 Tongue ball. R. W. Boje, Jr., Buffalo, N. Y.

1,552,074 Cushion tire. J. N. McFate, Phoenix, Ariz., and H. L. Glaze, Los Angeles, Calif., said Glaze assignor of four-tenths of his right to said McFate.

1,352,088 Ice-creeper of rubber with openings for prongs of removable metal creeper. T. Saia and M. Butera, Pittsburgh, Pa.

1,352,164 Repaired tire. C. W. Yelm, assignor to the Gates Rubber Co.—both of Denver, Colo.

1,352,306 Syringe. R. L. Mott, St. Louis, Mo.

1,352,370 Pneumatic tire with tread of metal sheathing. C. R. Irvine, Petrolia, Ont., Canada.

1,352,375 Cord tire construction. A. L. Meeks, Gadsden, Ala.

ISSUED SEPTEMBER 14, 1920

1,352,422 Maternity corset with elastic inserts. C. E. Anderson, Park City, Utah.

1,352,470 Resilient ring or annulus and method of manufacture; thin layers of vulcanized rubber built up around circular axis. J. F. Palmer, St. Joseph, Mich.

1,352,504 Windshield cleaner. W. M. Folberth, Cleveland, O.

1,352,614 Soft rubber suction cup for dental plates. J. Lehner, Pittsburgh, Pa.

1,352,650 Rubber bottle closure. C. E. Blanchard, Chicago, Ill.

1,352,677 Eraser attachment for pencils. W. W. Moore, Pittsburg, assignor to J. E. Roach, Oakland—both in California.

1,352,698 Pressure gage for tires. M. C. Schweinert, West Hoboken, N. J.

1,352,730 Shoe sole composed of layers of woven fabric and paper united thereto by cured phenolic condensation cementing material and a rubber composition sole. H. C. Egerton, Passaic, N. J.

1,352,731 Suction cup shoe sole, composed of layers of woven fabric and paper united thereto by cured phenolic condensation cementing material and a rubber composition sole. H. C. Egerton, Ridgewood, N. J.

1,352,732 Weather strip with vulcanized rubber facing strip. H. C. Egerton, Ridgewood, N. J.

1,352,733 Rubber-faced mat composed of layers of canvas fabric, impregnated with cured phenolic condensation cementing material, reinforced with metal and rubberized fabric, vulcanized together. H. C. Egerton, Ridgewood, N. J.

1,352,734 Gripping rubber shoe heel. H. C. Egerton, Ridgewood, N. J.

1,352,735 Tire valve and means of attaching to supporting fabric. H. C. Egerton, Ridgewood, N. J.

1,352,736 Rubber sole for turn shoes with reinforced edge for stitching to uppers. H. C. Egerton, Ridgewood, N. J.

1,352,737 Partially stiffened rubber composition shoe sole. H. C. Egerton, Ridgewood, N. J.

1,352,739 Vulcanized composition fabric, formed of layers of canvas body fabric impregnated with phenolic condensation cementing material, facing fabric, and vulcanizable rubber cementing composition. H. C. Egerton, Ridgewood, N. J.

1,352,740 Vulcanized rubber hose with inner rubber lining and rubber covering stiffened with strips of canvas impregnated with cured phenolic condensation cementing material, having an interposed cushioning layer of rubber between them. H. C. Egerton, Ridgewood, N. J.

1,352,769 Resilient cushion wheel. A. W. Tesch, Lansing, Ill.

1,352,770 Float for boats made of waterproofed flexible material in umbrella form. S. E. Van Horn, Manhasset, N. Y.

1,352,789 Combined dental mirror and syringe. J. E. Craig, Gary, Ind.

1,352,818 Respirator with diaphragm dividing it into eye and mouth spaces. A. B. Lamb, Washington, D. C.; E. W. Miller, Akron, O., and P. W. Carleton, Penns Grove, N. J.

1,352,838 Sun hat formed of a single piece of cloth with an elastic band gathering and dividing it into crown and brim. R. P. Satterfield, San Antonio, Texas.

1,352,863 Waterproof jewel wrist-safe. M. S. Zeitler and W. S. Lloyd—both of Washington, D. C.

1,352,885 Rubber core for tires, with sponge rubber outer strip. K. Fukada, Tokio, Japan.

1,352,942 Artificial pneumatic rubber foot fitted with inflatable inner tube. L. and C. B. Dodge, Morse Bluff, Neb.

1,352,943 Artificial pneumatic rubber foot, reinforced with ankle bracer and fitted with inflatable inner tube. L. and C. B. Dodge, Morse Bluff, Neb.

1;352,957 Blow-out patch. W. Van V. Hayes, New York City.

1,353,061 Dust cap for tire valves. G. B. Mullen, Bay Side, N. Y.

1,353,070 Infants' hose supporter. J. M. Regan, Darby, Pa.

1,353,125 Dust cap for pneumatic tire valves. J. Currie and H. W. Bell, Seattle, Wash.

1,353,130 Parachute. W. H. Ruff, Quincy, Ill.

1,353,131 Parachute. W. H. Ruff, Quincy, Ill.

THE DOMINION OF CANADA

ISSUED AUGUST 24, 1920

203,181 Heel with leather base and rubber pad having washers for fastening embedded in the rubber. P. N. Asquith, Toronto, Ont.

203,217 Stiffening shoe element comprising cotton fabric impregnated with cured phenolic condensation cementing material and a rubber portion vulcanized to said fabric. H. C. Egerton, Ridgewood, New Jersey, U. S. A.

203,224 Sanitary belt. E. I. M. Gaylor, London, England.

203,239 Rubber heel. G. A. Huben, Chicago, Ill., U. S. A.

203,248 Boot, shoe and overshoe, with rubber heel, sole and inner sole and copper inner plate. H. A. K. Rolant, Ottawa, Ont.

203,261 Life saver for aviators with compressed gas container and gas bag. W. Marshall, Bridgeton, New Jersey, U. S. A.

203,282 Parachute suit for aviators. W. Peterson, Newark, New Jersey, U. S. A.

203,283 Cushion heel. A. Rabinowitch, Chelsea, Mass., U. S. A.

203,285 Horn for vehicles, with rubber bulb. J. E. Reynolds, Birmingham, Warwick, England.

203,327 Cushion heel. The Anchor Grip Heel Co., assignee of E. M. Cook—both of Oberlin, O., U. S. A.

203,328 Fountain pen. The Autopoint Pencil Co., assignee of The Keeran Products Co., assignee of C. R. Keeran—all of Chicago, Ill., U. S. A.

Chemical Patents will be found on page 105. Machinery Patents on pages 107, 108.

203,333 Rubber sole. The Canadian Consolidated Rubber Co., Limited, Montreal, Que., assignee of M. H. Clark, Pelham, New York, U. S. A.
203,338 Microphone having sound-detecting device comprising closed chamber with rubber wall. The Canadian General Electric Co., Limited, Toronto, Ont., assignee of A. W. Hull, Schenectady, New York, U. S. A.
203,347 Rubber heel. The Essex Rubber Co., Trenton, N. J., assignee of A. Troiano, Washington, D. C.—both in U. S. A.
203,353 Rubber heel. The Granger Vacuum Rubber Heel Co., Inc., Cleveland, assignee of D. D. Granger, New London—both in Ohio, U. S. A.
203,354 Rubber heel. The Hill Rubber Heel Co., assignee of R. I. Hill—both of Elyria, O., U. S. A.
203,368 Golf ball. The Paramount Rubber Consolidated, Inc., Philadelphia, Pa., assignee of F. T. Roberts, Cleveland, O.—both in U. S. A.
203,386 Rubber sole, recessed for cement. J. Brenwood, Bury, Lancaster, assignee of A. Thill, London—both in England.
203,387 Rubber sole with non-skid feature. J. Brenwood, Bury, Lancaster, assignee of A. Thill, London, W.—both in England.

ISSUED AUGUST 31, 1920

203,437 Vibratory massaging device. S. McF. Coffman, Kansas City, Mo., U. S. A.
203,439 Devices for crimping fire hose. W. F. Corbin, Grand Rapids, Mich., U. S. A.
203,483 Hose supporter with rubber-covered loop. E. L. Lovejoy, Wakefield, Mass., U. S. A.
203,518 Sponge rubber inking pad. C. H. Payne, Cincinnati, O., U. S. A.
203,564 Belt of rubberized cord fabric with leather ends. The Canadian Consolidated Rubber Co., Limited, Montreal, Que., assignee of A. A. Somerville, New York City, U. S. A.

ISSUED SEPTEMBER 7, 1920

203,704 Solid tire, reinforced and yieldingly supported. F. W. Kremer, New York City, U. S. A.
203,740 Garment support and fastener. J. K. Seymour, Elyria, O., U. S. A.
203,784 Teat cup. The Ridd Co., Limited, assignee of A. Ridd—both of New Plymouth, New Zealand.

ISSUED SEPTEMBER 14, 1920

203,844 Anti-slipping ladder attachment with rubber insert. C. J. Brown, River Falls, Wis., U. S. A.
203,852 Collapsible rim for tires. J. E. Castle, Ridgefarm, Ill., U. S. A.
203,880 Metal wheel for pneumatic tires. J. M. Hall, Hamilton, Ont.
203,900 Dust cap for valve stems. A. L. Just, Syracuse, New York, U. S. A. (See The India Rubber World, October 1, 1920, page 35.)
203,921 Inflatable garment divided into compartments separately inflatable. K. Michalowsky, Akron, O., U. S. A.
203,940 Cap for tire valve stems. W. L. Richards, Portland, Ore., U. S. A.
203,962 Dust cap for tire valve. J. T. Ward, Los Angeles, Calif., U. S. A.
203,983 Tire valve. The Griffin Manufacturing Co., assignee of P. J. Griffin—both of Boston, Mass., U. S. A. (See also The India Rubber World June 1, 1920, page 591.)
203,998 Tire valve. A. Schrader's Son, Inc., New York City, assignee of E. Van A. Myers, East Orange, N. J.—both in U. S. A.
203,999 Valve or tire vulcanizing attachment. A. Schrader's Sons, Inc., New York City, assignee of J. Volckhausen, Weehawken, N. J.—both in U. S. A.

THE UNITED KINGDOM

ISSUED SEPTEMBER 1, 1920

145,538 Tire attachments to rims. A. Schrader's Son, Inc., 783 Atlantic ave., Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin ave., Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
145,550 Coupling for tire inflation pump. A. Schrader's Son, Inc., 783 Atlantic ave., Brooklyn, N. Y., assignee of M. C. Schweinert, 42 Riverside Drive, New York City—both in U. S. A. (Not yet accepted.)
145,551 Connection for pressure gage. A. Schrader's Son, Inc., 783 Atlantic ave., Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin ave., Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
145,552 Tire valve. A. Schrader's Son, Inc., 783 Atlantic ave., Brooklyn, N. Y., assignee of E. van A. Myers, 82 Evergreen Place, East Orange, N. J.—both in U. S. A. (Not yet accepted.)
145,553 Nuts for pneumatic tire valve. A. Schrader's Son, Inc., 783 Atlantic ave., Brooklyn, N. Y., assignee of H. P. Kraft, 219 Godwin ave., Ridgewood, N. J.—both in U. S. A. (Not yet accepted.)
145,678 Respirator. J. W. Paul and C. Hall, Pittsburgh, Pennsylvania, U. S. A.
145,692 Cushion tire and shock absorber. C. Noel, 25 rue Gravel, Levallois-Perret, France. (Not yet accepted.)

ISSUED SEPTEMBER 8, 1920

145,858 Stair treads, etc., of rubber or other material, reinforced with metal. H. Frood, Sovereign Mills, Chapel-en-le-Frith, Derbyshire.
146,043 Cover for bottles, jars, etc., with rubber rim. C. V. Childs, 34 Ensbury Park road, Moordown, Bournemouth.
146,066 Closure for receptacles, having rubber gasket inside cap. C. Columbani, 46 avenue de la Republique, Bondy, and J. B. M. Liarsou, 27 rue du Poteau, Paris—both in France.
146,105 Telephone transmitters. Miessner Inventions Corporation, assignee of B. F. Miessner—both of 217 Broadway, New York City, U. S. A. (Not yet accepted. Refers also to Specification No. 140,070.)
146,113 Dust cap for tire valves. J. T. Ward, 511 So. Boylston ave., Los Angeles, Calif., U. S. A. (Not yet accepted.)

ISSUED SEPTEMBER 15, 1920

146,334 Rubber-covered stocking supporter grips. Société Pugniet & Co., 127 avenue Jean Jaures, Paris, France. (Not yet accepted.)
146,339 Means for fastening load-suspension cable loops to balloon fabric. The Goodyear Tire & Rubber Co., assignee of H. T. Kraft—both of Akron, O., U. S. A. (Not yet accepted.)
146,345 Cushion tire. The Goodyear Tire & Rubber Co., assignee of J. E. Hale—both of Akron, Ohio, U. S. A. (Not yet accepted.)
146,347 Wheel tires. The Goodyear Tire & Rubber Co., 1144 East Market street, Akron, O., U. S. A. (Not yet accepted.)
146,361 Collapsible transversely divided rims for tires. E. A. Jones, Los Angeles, Calif., U. S. A. (Not yet accepted.)
146,443 Hydrometer with collapsible bulb. E. Edelman, 616 Waveland ave., Chicago, Ill., U. S. A.
146,458 Heels of cork, etc., with faces of rubber or other material. Suberit-Fabrik Nachfolger R. Messer, Cork and Artificial Cork Works, Mannheim, Germany. (Not yet accepted.)
146,494 Solid or cushion tire. E. Brunswick, 44 rue du Fg. du Temple, Paris, France. (Not yet accepted.)
146,513 Demountable rim for tires. J. C. Lewis, 27 School street, Boston, Mass., U. S. A. (Not yet accepted.)

GERMANY

PATENTS ISSUED, WITH DATES OF ISSUE

327,625 (July 20, 1918) Sectional belt. L. Sussmann, Gartenstrasse 110, Frankfort-on-Main.
327,595 (November 1, 1916) Tire cover of steel, with cloth lamelle, for pneumatic tires. F. Peyerl, Graz.
327,845 (January 22, 1920) Rubber shoe. P. Kuhnt, Bahnhofstrasse 7, Goerlitz.

TRADE MARKS

THE UNITED STATES

No. 111,190 The words Kandee Kote in fancy letters, the initial K serving to begin both words—chewing gum. The Shelby Supply & Manufacturing Co., Cleveland, O.
112,295 The words Beckton White—lithopone. E. I. du Pont de Nemours & Co., Wilmington, Del., and New York City.
114,489 The initials and word S. S. White—dental rubber sundries, etc. The S. S. White Dental Manufacturing Co., Philadelphia, Pa.
118,932 The words Diap-a-wash—combined wringer and washboard in form of a unitary article. The Pierson Co., Rockford, Ill.
120,886 The word Skotchemint—chewing gum. Short & Son Co., Reading, Pa.
121,467 The word Bandobelt—elastic diaphragm confiner. Frolaset Corset Co., Detroit, Mich.
121,898 The word Karlite—belting and packing of rubber, balata, duck, etc., or combinations of them. Imperial Belting Co., Chicago, Ill.
121,899 The word Antisulpho—belting and packing of rubber, balata, duck, etc., or combinations of them. Imperial Belting Co., Chicago, Ill.
121,901 The word Sahara—belting and packing of rubber, balata, duck, etc., or combinations of them. Imperial Belting Co., Chicago, Ill.
122,459 Seal bearing words Boston Belting Corporation, Boston, Mass, Original Manufacturers of Mechanical Rubber Goods, Established 1828, and the figure of an eagle standing on group of rolls of belting—rubber and rubber composition belting, hose and packing. Boston Belting Corporation, Boston, Mass.
125,637 The word Rubtex curved in a semi-circle in the space between upper portions of two concentric circles—rubberized cloth and blankets made therefrom. United States Rubber Co., New Brunswick, N. J., and New York City.
126,340 The word Protexal—protective and safety headgear and leather, rubber, asbestos, fireproofed, waterproofed and acid-proofed gloves, leggings and clothing. The Strong, Kennard & Nutt Co., Cleveland, O. (See The India Rubber World, May 1, 1920, page 204.)
126,687 The word Securo—endless and long-length belts of rubber-coated canvas or fabric. The Farm Equipment Co., Baltimore, Md.
127,600½ The words Green Cross Reliner within outline of a Greek cross—tire reliners. C. M. Lash, Columbus, O.
127,790 The word Aerograph—air brushes, spray painting apparatus operated by compressed air. The Aerograph Co., Limited, London, England.
128,071 The words Aero-Fount—fountain pens. E. O. Barker, Shanghai, China.
128,646 The word Chums—chewing-gum. Automatic Clerk Co., Newark, N. J.
128,791 The word Benflex—fabric-covered metal hose with rubber lining. Metal Hose & Tubing Co., Inc., Brooklyn, N. Y.
129,106 The words Tu-Way—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.
130,403 The word Steelaire—rubber tires. J. C. Dawson, Lynn, Mass.
130,421 The word Sprifoot—rubber soles and heels. Kleistone Rubber Co., Boston, Mass.
130,422 The word Kleistone—rubber soles and heels. Kleistone Rubber Co., Boston, Mass.
130,734 The word Staco in staggered letters within a double-outlined diamond bearing in its border the words Stone-Tarlow Co., Inc., Brockton, Mass., U. S. A.—leather, fabric or rubber boots and shoes. Stone-Tarlow Co., Inc., Brockton, Mass.
130,925 The fac-simile signature Patrick—rubber, metallic and composition hose with or without reinforcement, and with or without asbestos jacket. F. A. Patrick & Co., Duluth, Minn.
131,471 The word Picher with conventional outline border—sulfuric acid. The Eagle-Picher Lead Co., Cincinnati, O.
131,541 The word Truflite—handballs and tennis balls. (See The India Rubber World, July 1, 1920, page 682.) The Seamless Rubber Co., Inc., New Haven, Conn.

THE UNITED KINGDOM

393,246 Representation of a label bearing the words Adams California Fruit above a group of fruits—Chewing gum, etc. Adams & Beemans, Limited, 89 Great Eastern street, London, E. C. 2.

393,248 Facsimile signature of Thos. Adams—chewing gum, etc. Adams & Beemans, Limited, 89 Great Eastern street, London, E. C. 2.

395,972 Conventionalized representation of a palm tree, dividing the words Trade Mark, behind and eight-sided figure bearing the word Ofi—all goods included in Class No. 42. Naamlooze Vennootschap Oliefabrieken-Insulinde, 12-14 N. Doelenstraat, Amsterdam, Holland; address for service in the United Kingdom, care of Sefton-Jones, Odell & Stephens, 285 High Holborn, London, W. C. 1.

395,974 Conventionalized representation of a palm tree dividing the words Trade Mark, and behind an eight-sided figure bearing the word Ofi—all goods included in Class No. 48. Naamlooze Vennootschap Oliefabrieken-Insulinde, 12-14 N. Doelenstraat, Amsterdam, Holland; address for service in the United Kingdom, care of Sefton-Jones, Odell & Stephens, 285 High Holborn, London, W. C. 1.

DESIGNS

THE UNITED STATES

No. 56,113 Tire tread. Patented August 24, 1920. Term 14 years. M. L. A. A. Allard, Akron, assignor to W. H. Milliken, Cleveland—both in Ohio.

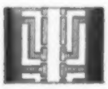
56,122 Tire. Patented August 24, 1920. Term 14 years. V. Ehrlicher, assignor to The Charles William Stores, Inc.—both of Brooklyn, New York.

56,123 Swimming cap. Patented August 24, 1920. Term 14 years. W. D. Forbes, Oakland, California.

56,151 Sanitary belt. Patented August 24, 1920. Term 14 years. V. Guinzburg, assignor to I. B. Kleinert Rubber Company—both of New York City.

56,158 Tire. Patented August 24, 1920. Term 7 years. R. H. Holbrook, assignor to The Charles William Stores, Inc.—both of Brooklyn, New York.

56,217 Tire tread. Patented August 31, 1920. Term 7 years. H. B. Bixler, Akron, assignor to the Chillicothe Tire and Rubber Company, Chillicothe—both in Ohio.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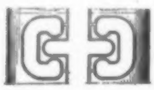
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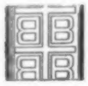
56,266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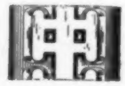
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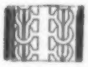
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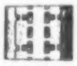
56,113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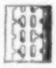
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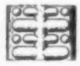
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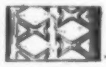
56,300

398,824 The word Thornhills above a representation of a running elephant, in turn above the words Tropical Tyres—tires included in Class No. 40. B. A. Thornhill, Single Tree, Newera Eliya, Ceylon, and The Manor House, Shropshire.

399,696 The words The Lastawl Company and the representation of a fisherman pulling in his net—all goods included in Class No. 40, including those of rubber and fiber composition. E. S. Rowlandson, trading as The Lastawl Co., 132 Boundary street, Liverpool, Lancashire.

400,226 Two intersecting triangles forming six-pointed star bearing the letters BBL in the center—vulcanizing apparatus, etc. Brown Brothers, Limited, 22-34 Great Eastern street, London, E. C. 2.

400,267 Representation of a seal bearing monogram SHM, above the word Newmatthose—hose for use with compressed air plant and pneumatic tools. S. H. Matthews, 20 Royal Arcade, Newcastle-on-Tyne.

400,303 Representation of a carnation beneath the word Carnation—rubber sandalings, webs and cords. Pett, Hammett & Co., Limited, Dr. Johnson Passage, Bull street, Birmingham.

400,913 Representation of a partridge standing within a tire and the words Trade Mark—rubber footwear. The F. E. Partridge Rubber Co., Limited, 1 Metcalfe street, Guelph, Ontario. Canada; address for service in the United Kingdom, care of Abel & Imray, 30 Southampton Buildings, London, W. C. 2.

401,494 The word Goodwill—pneumatic tires and tubes. P. M. Wilson, trading as P. Wilson, 85 rue Quentin-Boouchart, Champs-Elysees, Paris, 8, France; address for service in the United Kingdom, care of Abel & Imray, 80 Southampton Buildings, London, W. C., 2.

401,608 Representation of two monkeys swinging on an inner tube suspended from the word Moco, above the words Monkey Grip and Trade Mark—rubber patches and patching material for repairing tires, rubber boots, garden hose, etc. The Moco Company of America, Inc., Moco Building, West Thirteenth street, Oklahoma, Okla., U. S. A.; address for service in the United Kingdom, care of W. P. Thompson & Co., 12 Church street, Liverpool.

401,805 Representation of a hand holding aloft a spring—rubber and gutta percha goods not included in classes other than No. 40. Herbert Terry & Sons, Limited, Novelty Works, Lodge road, Redditch, Warwickshire.

402,511 Representation of a seal bearing the words Tiny-Tot above a baby lying in a powder puff, and around the edge of the seal the words United Drug Company, Boston, Mass., U. S. A.—manufactured rubber and gutta percha goods not included in classes other than No. 40. The United Drug Co., corner Greenleaf and Leon streets, Boston, U. S. A., and 114 Old Hall street, Liverpool.

403,039 The word Calrub—waterproof garments. W. Currie & Co., Caledonian Rubber Works, Dalry road, Edinburgh.

403,065 Representation of the head of a bulldog—all goods included in Class No. 40, except machine belting and elastic gusset webs. The Beldam Packing and Rubber Co., Limited, 29 Gracechurch street, London, E. C., 3.

403,099 The word Rexean within a double-bordered diamond—fountain and stylographic pens. Rexean Company, Limited, 141 Lord street, Southport.

403,161 Representation of a seal in bas relief bearing profile bust of a man and the word Maharajah—rubber goods included in Class No. 11. Radium Gummiwerke Gesellschaft Mit Beschränkter Haftung, Gummiwaren Fabrik Gravenmüklenweg, Dellbrück, near Cologne, Germany; address for service in the United Kingdom, care of Sefton-Jones, Odell & Stephens, 285 High Holborn, London, W. C. 1.

403,198 Representation of a compass beneath the word Compass, and surrounded by the letters N, E, S and W to indicate direction—all goods included in Class 49. George MacLellan & Co., Limited, Glasgow Rubber Works, Shuna street, Maryhill, Glasgow.

THE DOMINION OF CANADA

27,012. The words Nu-Way Strech on oval enclosing representation of pair of suspenders—suspenders and garters. Nu-Way Strech Suspender Co., Dundee, Mich., U. S. A.

27,058. The word Wids—rubber heels. Wids Co., St. Paul, Minn., U. S. A.

56,243 Tire tread. Patented August 31, 1920. Term 14 years. H. H. Swan, Grand Rapids, Michigan.

56,247 Rubber eraser head for lead pencils. Patented September 7, 1920. Term 14 years. E. Faber, New York City.

56,260 Elastic vehicle tire. Patented September 14, 1920. Term 14 years. J. M. Alderfer, Akron, Ohio.

56,265 Tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,266 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,267 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,268 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,269 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,270 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,271 Elastic tire tread. Patented September 14, 1920. Term 14 years. E. O. Blekre, Sioux City, Iowa.

56,282 Tire casing. Patented September 14, 1920. Term 14 years. R. Iredell, assignor to The General Tire and Rubber Company—both of Akron, Ohio.

56,299 Tire tread. Patented September 14, 1920. Term 14 years. J. C. McLean, Lakewood, assignor to The McLean Tire and Rubber Company, Cleveland—both in Ohio.

56,300 Tire. Patented September 14, 1920. Term 14 years. J. C. McLean, assignor to The McLean Tire and Rubber Company—both of Cleveland, Ohio.

56,307 Pneumatic tire. Patented September 14, 1920. Term 14 years. R. M. Pierson, Akron, Ohio, assignor to The B. F. Goodrich Company, New York City.

THE DOMINION OF CANADA

4,856 Tire tread. Patented August 26, 1920. W. Seward, Toronto, Ont.

4,857 Tire tread. Patented August 26, 1920. W. Seward, Toronto, Ont.

GERMANY

DESIGN PATENTS ISSUED, WITH DATES OF ISSUE

748,837 (August 11, 1919) Elastic tire. A. Gascard, Neumarkt 8, Leipzig.

749,081 (August 23, 1919) Elastic tire. A. Klein, Werdau.

749,247 (May 3, 1920) Cover for pneumatic tire. G. Rosenbaum, Prager Platz 4, Berlin-Wilmersdorf.

749,113 (July 19, 1920) Rubber disk for sole covering. Deutsche Dunlop Gummi Compagnie A. G., Hanau-on-Main.

749,691 (August 9, 1920) Rubber heel with anti-slipping device. F. W. Hoehn, Schassstrasse 21, Kiel.

749,718 (June 17, 1920) Packing for high pressure steam joints. Fa. R. Schroeder, Elberfeld.

750,006 (July 5, 1920) Pneumatic vulcanizing apparatus with steam conductor and condensed water deductor in one pipe. A. Marschall, Gutleutstrasse 96, Frankfort-on-the-Main.

750,007 (July 5, 1920) Pneumatic vulcanizing apparatus with welded table plate. A. Marschall, Gutleutstrasse 96, Frankfort-on-the-Main.

750,008 (July 5, 1920) Vulcanizing apparatus with exchangeable vulcanizing core for partial and whole tire vulcanization. A. Marschall, Gutleutstrasse 96, Frankfort-on-the-Main.

750,010 (July 6, 1920) Tubeless closed tire of rubber or other materials. J. J. Cairns, Hove, England.

750,100 (July 21, 1920) Steel insert for pneumatic tires. H. Greissinger, Bismarckstrasse 18, Erfurt.

750,101 (July 22, 1920) Non-breakable ruler of special rubber. W. Arnold, Grossmannstrasse 1, Dresden.

750,181 (July 17, 1920) Pneumatic tire. J. A. Andrews, Liverpool, England.

750,184 (July 19, 1920) Repair ribbon for bicycle tire covers. F. Laemmel, Gornsdorf i. Erzgeb.

750,532 (August 11, 1920) Tire connection. Progresswerk Oberkirch A. G., Stadelhofen i. B.

750,533 (August 12, 1920) Pneumatic tire with inserted running band. R. Schnauder, Stephanienstrasse 10, Dresden.

750,534 (August 13, 1920) Rubber running band for pneumatics. R. Schnauder, Stephanienstrasse 10, Dresden.

Review of the Crude Rubber Market

NEW YORK

Continued depression in the crude rubber market during October resulted in lower prices for all grades of spot and future rubber. Spot first latex crêpe sold for 23½ cents, and ribbed smoked sheets for 21 cents, the lowest prices on record. Futures also made low records, January-June, first latex being sold for 27½ cents and ribbed smoked sheets for 26½ cents. The same conditions ruled in Brazilian sorts, spot upriver fine making a low record of 24 cents.

While there was some buying of spot and near-by rubber for manufacturers' account and immediate need, the volume was not large and consisted of small lots sold under the market. Dealers' business has apparently fallen off considerably, which is, doubtless, due to the necessity of avoiding further complications until the monthly commitments have been disposed of.

The market undoubtedly lacks definite support from the consuming trade that, in turn, is holding off on account of the small demand for manufactured rubber goods. The tire manufacturers, in particular, have been forced to curtail production materially, and several have shut down completely.

With an accumulation of 30,000 tons said to be in New York and 40,000 tons in London, the position of spot and near-by rubber is decidedly weak and indicates lower prices.

Arrivals of crude rubber during September, 1920, were 11,636 tons compared with 14,036 a year ago. Total arrivals for nine months ended September 30, 1920, were 192,973 tons compared with 156,795 tons for the same period in 1919.

Spot and future quotations on standard plantation and Brazilian sorts at the first and last of the past month were as follows:

Plantations. October 2, first latex crêpe, 25½ to 26 cents; November-December, 26 to 26½ cents; January-June, 30½ to 31 cents.

October 26, first latex crêpe, 24 cents; November-December, 24 cents; January-June, 27 cents.

October 2, ribbed smoked sheets, 23 to 23½ cents; November-December, 24½ cents; January-June, 29½ cents.

October 26, ribbed smoked sheets, 22 cents; November-December, 22½ cents; January-June, 26 cents.

October 2, No. 1 amber crêpe, 20 to 22 cents.

October 26, No. 1 amber crêpe, 20 cents.

October 2, No. 1, rolled brown crêpe, 17 to 18 cents.

October 26, No. 1 rolled brown crêpe, 16 cents.

South American Paras and Caucho. October 2, upriver, fine, 25 to 26 cents; islands, fine, 25 cents; upriver coarse, 16 to 16½ cents; islands coarse, 15 cents; Cametá coarse, 15 cents; caucho ball, 18 to 18¼ cents.

October 26, upriver fine, 24½ cents; islands fine, 23 cents; upriver coarse, 16 cents; islands coarse, 15 cents; Cametá coarse, 14 cents; caucho ball, 14 to 17 cents.

NEW YORK QUOTATIONS

Following are the New York spot quotations, for one year ago, one month ago, and October 26, the current date:

	November 1, 1919	October 1, 1920	October 26, 1920
PLANTATION HEVEA—			
First latex crêpe	$0.53 @	$0.25 @.26	$0.24 @
Amber crêpe No. 1	.49 @	.21 @.23	.20 @
Amber crêpe No. 2	.48 @	.22 @	.19 @
Amber crêpe No. 3	.47 @	.21 @	.18 @
Amber crêpe No. 4	.46 @	.20 @	.17 @
Brown crêpe, thick and thin	.44 @	.19 @.23	.19 @
Brown crêpe, specky	.41½ @	.20 @	.16 @
Brown crêpe, rolled	.40½ @	.17½ @.18	.16 @
Smoked sheet, ribbed, standard quality	.52 @	.23¾ @.24½	.22 @
Smoked sheet, plain standard quality	.49 @	.22 @	.20 @
Unsmoked sheet, standard quality	.47 @	.19 @	.19 @
Colombo scrap No. 1	.35 @	.15 @	.17 @
Colombo scrap No. 2	.32 @	.14 @	.16 @
EAST INDIAN—			
Assam crêpe	$0.48 @	@	@
Assam onions	@	@	@
Penang black scrap	@	@	@
PONTIANAK—			
Banjermassin	.11 @.12	.10 @.11	.09 @
Palembang	.12¾ @	.10½ @.13	@
Pressed block	.22 @	.18 @.21	.18 @
Sarawak	.09¾ @	.09 @	@
SOUTH AMERICAN—			
PARAS—			
Upriver, fine	.52½ @.53	.25 @.26	.24½ @
Upriver, medium	.50 @	.23 @.24	.20 @
Upriver, coarse	.34½ @	.16½ @.18	.16 @
Upriver, weak, fine	.41 @	.21 @.22	.19 @
Islands, fine	.47½ @.48	.25 @.26	.23 @
Islands, medium	.45 @	.23 @	.19 @
Islands, coarse	.21½ @	.15 @	.15 @
Cametá, coarse	.23 @	.15 @.15½	.14 @
Madeira, fine	.53½ @	.29 @	.29 @
Acre Bolivian, fine	.53½ @	.28 @	.25 @
Peruvian, fine	.51 @	.26 @	.22 @
Tapajos, fine	.50 @	.23 @	.21 @
CAUCHO—			
Upper caucho ball	.31 @	.19 @	.17 @
Lower caucho ball	.35 @	.14 @	.14 @
MANICOBAS—			
Ceará negro heads	.40 @	*.14 @	*.18 @
Ceará scrap	.30 @	*.12 @	*.10 @
Manicoba, 30% guarantee	.37 @	*.15 @	*.15 @
Mangabeira thin sheet	.40 @	*.18 @	*.20 @
CENTRALS—			
Corinto scrap	.34 @.34½	.17 @.18	@
Esmeralda sausage	.34 @.34½	.17 @.18	@
Central scrap	.34 @.34½	.17 @.18	@
Central scrap and strip	.30 @	.15 @.17	@
Central wet sheet	.24 @.24½	.13 @	@
Guayule, 20% guarantee	.27 @	.25 @	.25 @
Guayule, washed and dried	.36 @	.35 @	.37 @
AFRICANS—			
Niger flake, prime	.18 @	.18¾ @	@
Benguela, extra No. 1, 28%	@	.11 @.15	@
Benguela. No. 2, 32½%	.26½ @	@	@
Conakry niggers	@	@	@
Congo prime, black upper	@	@	@
Congo, prime, red upper	@	@	@
Kasai black	@	@	@
red	@	@	@
Massai sheets and strings	@	@	@
Rio Nunez ball	@	@	@
Rio Nunez sheets and strings	@	@	@
GUTTA PERCHA—			
Gutta Siak	.23 @.25	.19 @.20	.19 @
Red Macassar	2.60 @2.75	3.50 @	2.90 @
BALATA—			
Block, Ciudad Bolivar	.57 @.60	.63 @	.70 @
Colombia	.48 @.50	.48 @	.46 @
Panama	.40 @.45	.35 @	.33 @
Surinam sheet	.84 @.85	.69 @	.70 @
amber	.87 @.88	.84 @	.76 @

*Nominal.

RECLAIMED RUBBER

Owing to the depressed state of the rubber manufacturing industry generally the demand for reclaims has practically ceased. Such calls for reclaims as do appear come largely from manufacturers of heels and clothing. In all other lines not enough interest exists in reclaims to make a market. The outlook, however, is optimistic for general resumption of rubber manufacturing activity by the first of next year.

The following quotations are nominal and are the same as reported for September 27.

NEW YORK QUOTATIONS.

October 26, 1920

Prices subject to change without notice

STANDARD RECLAIMS:			
Floating	*$0.22	@	$0.24
Friction	*.25	@	.30
Mechanical	*.11	@	.12
Shoe	*.14¾	@	.15½
Tires, auto	*.14½	@	.15
truck	*.12½	@	.13½
White	*.20	@	.21

*Nominal.

THE MARKET FOR COMMERCIAL PAPER

In regard to the financial situation, Albert B. Beers, broker in crude rubber and commercial paper, No. 1 Liberty street, New York City, advises as follows:

"During October the demand for commercial paper has improved somewhat over September, though still almost entirely from out-of-town banks, rates ruling at 8½ per cent to 8¾ per cent for the best rubber names, and 9 per cent for those not so well known."

COMPARATIVE HIGH AND LOW NEW YORK SPOT RUBBER PRICES

	October					
	1920*		1919		1918	
PLANTATIONS—						
First latex crêpe...	$0.26	@$0.23½	$0.53½	@$0.49¼	$0.62	@$0.37
Smoked sheet ribbed	.24	@ .21½	.52½	@ .48½	.61	@ .35
PARAS—						
Upriver, fine	.26	@ .24½	.55	@ .52	.66	@ .56
Upriver, coarse	.17	@ .16	.35	@ .33	.36	@ .30
Islands, fine	.24	@ .20	.48½	@ .48	.59	@ .44
Islands, coarse	.16	@ .14½	.23½	@ .22	.38	@ .20
Cametá	.15½	@ .14	.23	@ .22	.29	@ .31

*Figured to October 27.

AMSTERDAM RUBBER MARKET

JOOSTEN & JANSSEN, Amsterdam, report [October 2, 1920]: The rubber market this week was very excited. Originally prices increased rapidly, but suddenly there came a reaction and prices collapsed, especially on the terminal market.

There was a rather good turnover of spot crêpe and sheets, and also on the terminal market rather big lots were disposed of. The highest price paid for standard crêpe, on the spot, was f.1.08, and crêpe on the terminal market brought f.1.08 for November and f.1.11 for January.

Finally December crêpe was sold at f.0.95, April at f.1.01. Buyers were scarce.

SINGAPORE RUBBER MARKET

GUTHRIE & CO., LIMITED, Singapore, report [September 9, 1920]: The weekly rubber auction opened yesterday to a weak market and lower prices. Fine pale crêpe sold up to 64 cents (64½ cents was paid for three lots), and ribbed smoked sheet touched 63½ cents paid for two lots only, showing declines of 4½ and 6½ cents on the week. Off quality lots of crêpe and sheet were in some demand at 4 cents down. Lower grades were a poor market at 6/8 cents below last week's prices. The sale closed at best, prices being steady at crêpe 64½ cents, sheet 63½ cents.

Of 991 tons cataloged, 525 tons were sold.

The following is the course of values:

	In Singapore per Pound[1]		Sterling Equivalent per pound in London	
Sheet, fine ribbed smoked.......	61½c	@ 63c	1/ 7⅞	@ 1/ 8
Sheet, good ribbed smoked......	48½	@ 60	1/ 4	@ 1/ 7¼
Crêpe, fine pale	63½	@ 64	1/ 8¾	@ 1/ 8⅞
Crêpe, good pale	50	@ 61	1/ 4⅞	@ 1/ 8
Crêpe, fine brown	45	@ 49½	1/ 3½	@ 1/ 4¾
Crêpe, good brown	35	@ 43½	1/ 0⅝	@ 1/ 3
Crêpe, dark	32	@ 38	—/11¼	@ 1/ 1½
Crêpe, bark	20	@ 34¾	—/ 8⅛	@ 1/ 0½

[1]Quoted in Straits Settlements, currency $1 = $0.;567 United States currency.

STRAITS SETTLEMENTS RUBBER EXPORTS

An official report from Singapore states that the export of rubber from Straits Settlements ports in the month of August amounted to 6,673 tons (transhipments, 1,622 tons) as compared with 10,773 tons in July and 8,933 tons in the corresponding month last year. The total exports for eight months of the current year amount to 90,929 tons against 99,476 tons in 1919 and 45,407 tons in 1918. Appended are the comparative statistics:

	1918	1919	1920
January ....tons	4,302	14,404	13,125
February	2,334	15,661	17,379
March	8,858	20,908	5,931
April	6,584	10,848	9,768
May	13,587	15,845	15,617
June	6,515	5,059	11,663
July	1,978	7,818	10,773
August	1,249	8,933	6,673
Totals	45,407	99,476	90,929

Correction—The figures given in previous notifications for the month of April, 1920, namely, 15,720 tons, were incorrect. The correct figures should be 9,768 tons, as in accompanying comparative statement.

RUBBER EXPORTS FROM PENANG

	January 1 to August 25	
	1919	1920
To Great Britain ....piculs[1]	136,246	159,976
Europe	....	2,988
United States	75,225	120,054
Totals ....piculs	211,471	283,018

[1] One picul equals 133⅓ pounds.

PLANTATION RUBBER FROM THE FAR EAST

TOTAL EXPORTS FROM MALAYA

From January 1, 1920, to dates named, excluding all foreign transshipments. Reported by Barlow & Co., Singapore.

	From				
To—	Singapore, July 31, 1920	Malacca, July 31, 1920	Penang, July 31, 1920	Port Swettenham, July 31, 1920	Totals
United Kingdom.*lbs.*	31,072,306	1,688,907	17,983,467	16,626,998	67,371,678
The Continent ...	3,947,215	....	398,400	150,007	4,495,622
Japan	7,970,744	....	2,277	....	7,973,021
Ceylon	10,229	....	302,534	1,159,993	1,472,756
U. S. A. and Canada	175,174,820	42,214	15,149,600	....	190,366,634
Australia	240,901	....	....	....	240,901
China (Hong Kong)	....	....	....	....	....
Other countries ...	....	....	400	....	400
Totals	218,416,215	1,731,121	33,836,678	17,936,998	271,921,012
For the year 1919.	352,338,000	17,849,500	25,779,500	30,805,166	426,772,166
For the year 1918.	225,100,000	837,600	12,479,200	....	238,416,800
For the year 1917.	177,901,200	15,113,200	23,402,000	....	216,416,400
For the year 1916.	135,535,954	7,167,346	30,643,565	3,660,840	177,007,705
For the year 1915.	86,067,657	7,898,984	28,580,663	821,445	123,368,749
For the year 1914.	43,534,177	5,218,379	21,912,567	2,052,620	72,717,743

FEDERATED MALAY STATES RUBBER EXPORTS

An official report from Kuala Lumpur states that the exports of plantation rubber in the month of August amounted to 9,140 tons, as compared with 8,043 tons in July and 10,626 tons in the corresponding month of last year. The total exports for eight months of the current year amount to 72,658 tons compared with 69,983 tons in 1919 and 51,554 tons in 1918.

Appended are the comparative figures:

	1918	1919	1920
January ....tons	7,588	7,163	11,119
February	6,820	10,809	9,781
March	7,709	10,679	9,524
April	7,428	7,664	8,375
May	5,851	7,308	7,627
June	5,161	7,094	9,049
July	5,706	8,640	8,043
August	5,291	10,626	9,140
Totals ....tons	51,554	69,983	72,658

CEYLON RUBBER IMPORTS AND EXPORTS

IMPORTS

	January 1, to September 13	
Crude rubber:	1919	1920
From Straits Settlements ....*pounds*	1,861,283	1,928,908
India	997,545	1,080,121
Burma and other countries............	......	26,259
Totals	2,858,828	3,035,288

EXPORTS

	1919	1920
Crude rubber:		
To United Kingdom ....*pounds*	19,957,221	27,546,141
Belgium	29,120	147,150
France	330,010	575,254
Germany	......	173,475
Netherlands	......	22,358
Italy	......	112,000
Australia	......	56
Victoria	98,755	190,469
United States	41,143,943	26,101,165
New South Wales........................	154,212	284,178
Canada and Newfoundland...............	260,026	425,600
India	2,313	586
Straits Settlements	454	44,800
Japan	186,626	157,667
Totals ....*pounds*	62,162,680	55,780,899

(Compiled by the Ceylon Chamber of Commerce.)

PLANTATION RUBBER EXPORTS FROM JAVA

	July		Seven Months Ended July 31	
	1919	1920	1919	1920
To Netherlands ....*kilos*	*	396,000	*	2,608,000
Great Britain	790,000	924,000	4,604,000	4,714,000
Germany	*	24,000	*	59,000
France	*	11,000	*	11,000
Belgium	*	....	*	14,000
Other European destinations	236,000**	....	590,000**	....
United States	458,000	979,000	10,565,000	9,105,000
Singapore	123,000	369,000	3,086,000	2,671,000
Japan	....	....	179,000	184,000
Australia	....	114,000	*.......	163,000
Other countries	....	....	202,000	....
Totals ....*kilos*	1,607,000	2,817,000	19,226,000	19,529,000
Ports of origin:				
Tandjong Priok	968,000	1,261,000	10,117,000	9,198,000
Samarang	57,000	34,000	318,000	280,000
Soerabaya	582,000	1,397,000	8,069,000	9,465,000

* Not mentioned in 1919.
** Not specified in 1919.

CRUDE RUBBER ARRIVALS AT ATLANTIC AND PACIFIC PORTS AS STATED BY SHIPS' MANIFESTS

PARAS AND CAUCHO AT NEW YORK

	Fine	Medium	Coarse	Caucho	Totals Pounds
September 30. By the S. S. *Francis*, from Pará.					
Wm. Schall & Co.	38,375	....	....	21,614	59,989
September 30. By the S. S. *Francis*, from Iquitos.					
W. R. Grace & Co.	....	....	....	....	1,764
Various	....	....	....	....	1,176
September 30. By the S. S. *Francis*, from Manáos.					
Poel & Kelly	137,943	5,979	97	226,324	370,343
Bennett, Day & Co.	....	....	....	....	490
G. Amsinck & Co., Inc.	....	....	....	....	3,332
Meyer & Brown, Inc.	257,600	....	11,200	....	268,800
September 30. By the S. S. *Sallust*, from Pará and Bahia.					
Poel & Kelly	6,787	....	6,851	26,204	39,842
General Rubber Co.	....	....	....	....	4,508
Meyer & Brown, Inc.	....	....	9,520	4,480	14,000
Various	....	....	....	....	80,708

PLANTATIONS

(*Figured 180 pounds to the bale or case*)

	Shipment from:	Shipped to:	Pounds	Totals
September 8. By the S. S. *Madioen*, at New York.				
The United Malaysian Rubber Co., Limited	Banjermassin	New York	9,039	9,039
September 20. by the S. S. *City of Spokane*, at Seattle.				
Mitsui & Co., Limited	Singapore	Seattle	43,200	
Various	Singapore	Seattle	41,580	84,780
September 20. By the S. S. *West Cadron*, at San Francisco.				
American Finance & Commerce Co.	Hongkong	San Francisco	80,820	80,820
September 22. By the S. S. *Lisbon Maru*, at New York.				
S. W. Bridges & Co., Inc.	Tokyo	New York	90,000	
Fred Stern & Co.	Kobe	New York	78,400	168,400
September 24. By the S. S. *West Cactus*, at San Francisco.				
Mitsui & Co., Limited	Singapore	San Francisco	43,200	43,200
September 25. By the S. S. *Slavic Prince*, at New York.				
Boston Insulated Wire & Cable Co.	Singapore	Dorchester	12,600	
Balfour, Williamson & Co.	Singapore	New York	57,240	
Thos. A. Desmond & Co.	Singapore	New York	44,640	
Edward Maurier Co., Inc.	Singapore	New York	25,920	
Baird Rubber & Trading Co.	Singapore	New York	156,800	
L. Littlejohn & Co., Inc.	Singapore	New York	405,000	
Thornett & Fehr, Inc.	Singapore	New York	54,000	
William H. Stiles & Co.	Singapore	New York	130,000	
W. R. Grace & Co.	Singapore	New York	107,640	
Fred Stern & Co.	Singapore	New York	252,720	
Poel & Kelly	Singapore	New York	194,220	
Aldens' Successors, Inc.	Singapore	New York	81,180	
Chas. T. Wilson Co., Inc.	Singapore	New York	91,800	
W. G. Ryckman, Inc.	Singapore	New York	56,000	
Rubber Importers & Dealers' Co., Inc.	Singapore	New York	228,060	
F. R. Henderson & Co.	Singapore	New York	105,840	
Frank Waterhouse & Co.	Singapore	New York	43,200	
Rogers-Pyatt Shellac Co.	Singapore	New York	72,000	
General Rubber Co.	Singapore	New York	220,320	
Meyer & Brown, Inc.	Singapore	New York	246,400	
Hood Rubber Co.	Singapore	Watertown	179,200	
The B. F. Goodrich Co.	Singapore	Akron	96,300	
Whittall & Co., of Ceylon.	Singapore	New York	16,200	
Various	Singapore	New York	1,012,140	
Joosten & Janssen (*as agents*)	Penang	New York	89,600	
The Goodyear Tire & Rubber Co.	Penang	Akron	74,600	
Various	Singapore	Toronto	88,920	4,142,540
September 26. By the S. S. *Rotterdam*, at New York.				
Meyer & Brown, Inc.	Rotterdam	New York	44,800	
L. Littlejohn & Co., Inc.	The East	New York	2,726	47,526
September 27. By the S. S. *Roseric*, at New York.				
Meyer & Brown, Inc.	Colombo	New York	44,800	
Chas. T. Wilson Co., Inc.	Colombo	New York	9,116	
L. Littlejohn & Co., Inc.	Colombo	New York	11,200	
Fred Stern & Co.	Colombo	New York	11,200	
Baird Rubber & Trading Co.	Singapore	New York	22,400	98,716
September 29. By the S. S. *Sommelsdijk*, at New York.				
Aldens' Successors, Inc.	Soerabaya	New York	126,720	
Meyer & Brown, Inc.	Far East	New York	10,080	
Manhattan Rubber Mfg. Co.	Batavia	New York	27,000	
Robertson, Cole & Co.	Batavia	New York	71,640	
Hagemeyer Trading Co.	Batavia	New York	18,000	
Chas. T. Wilson Co., Inc.	Batavia	New York	22,198	
L. Littlejohn & Co., Inc.	Batavia	New York	179,200	
Fred Stern & Co.	Batavia	New York	134,400	
Various	Belawan-Deli	New York	54,720	
Various	Soerabaya	New York	236,640	880,598
September 29. By the S. S. *Siletz*, at New York.				
Chas. T. Wilson Co., Inc.	Colombo	New York	29,480	
L. Littlejohn & Co., Inc.	Soerabaya	New York	819,848	
Poel & Kelly	Soerabaya	New York	21,240	
Various	Soerabaya	New York	362,620	
Hood Rubber Co.	Far East	Watertown	146,150	
J. Aron & Co.	Singapore	New York	5,040	
Aldens' Successors, Inc.	Singapore	New York	8,100	
Fred Stern & Co.	Singapore	New York	358,400	
Meyer & Brown, Inc.	Singapore	New York	67,200	
Baird Rubber & Trading Co.	Singapore	New York	11,200	
Winter, Ross & Co.	Batavia	New York	18,720	
Poel & Kelly	Batavia	New York	60,120	1,908,118
September 29. By the S. S. *Altai Maru*, at New York.				
Meyer & Brown, Inc.	Singapore	New York	22,400	
L. Littlejohn & Co., Inc.	Singapore	New York	293,307	
Thornett & Fehr, Inc.	Singapore	New York	46,220	
Pacific Trading Corp. of America	Singapore	New York	13,500	
Fred Stern & Co.	Singapore	New York	177,300	
Chas. T. Wilson Co., Inc.	Singapore	New York	134,500	
Hood Rubber Co.	Singapore	Watertown	280,980	
Falls Rubber Co.	Singapore	Cuy'oga Falls	53,280	
Various	Singapore	New York	69,460	1,090,947
October 1. By the S. S. *Arcturus*, at New York.				
Pell & Dumont, Inc.	Singapore	New York	50,400	
Meyer & Brown, Inc.	Singapore	New York	352,800	
W. R. Grace & Co.	Singapore	New York	217,980	
W. T. Sargent & Sons	Singapore	New York	20,520	
Rogers-Pyatt Shellac Co.	Singapore	New York	73,800	
Henderson, Forbes & Co.	Singapore	New York	196,700	
Pacific Trading Corp. of America	Singapore	New York	13,500	
A. C. Fox & Co.	Singapore	New York	10,080	
F. R. Henderson & Co.	Singapore	New York	185,580	
L. Littlejohn & Co., Inc.	Singapore	New York	89,800	
Chas. T. Wilson Co., Inc.	Singapore	New York	183,800	
Balfour, Williamson & Co.	Singapore	New York	20,160	
Various	Singapore	New York	429,440	
Fred Stern & Co.	Batavia	New York	100,800	
Pacific Trading Corp. of America	Penang	New York	6,300	
Henderson, Forbes & Co.	Penang	New York	77,760	
Hood Rubber Co.	Far East	Watertown	101,100	2,130,520
October 4. By the S. S. *Tregenna*, at New York.				
Thornett & Fehr, Inc.	Colombo	New York	28,800	
Aldens' Successors, Inc.	Colombo	New York	5,040	
Fred Stern & Co.	Colombo	New York	5,040	
Chas. T. Wilson Co., Inc.	Colombo	New York	103,500	
Thos. J. Lipton, Inc.	Colombo	New York	10,620	
L. Littlejohn & Co., Inc.	Colombo	New York	22,400	
Baird Rubber & Trading Co.	Colombo	New York	8,960	
Various	Colombo	New York	171,890	356,250
October 2. By the S. S. *Sommelsdijk*, at New York.				
The United Malaysian Rubber Co., Limited	Banjermassin	New York	1,106	1,106
October 4. By the S. S. *Lowther Castle*, at New York.				
Hood Rubber Co.	Singapore	Watertown	221,760	
F. R. Henderson & Co.	Singapore	New York	456,300	
W. R. Grace & Co.	Singapore	New York	163,080	
Edward Maurer Co., Inc.	Singapore	New York	258,120	
Thornett & Fehr., Inc.	Singapore	New York	130,500	
William H. Stiles & Co.	Singapore	New York	100,000	
Rubber Importers & Dealers Co., Inc.	Singapore	New York	98,280	
A. C. Fox & Co.	Singapore	New York	53,460	
The Fisk Rubber Co.	Singapore	Chicopee Falls	89,269	
Chas. T. Wilson Co., Inc.	Singapore	New York	152,950	
Aldens' Successors, Inc.	Singapore	New York	136,080	
L. Littlejohn & Co., Inc.	Singapore	New York	313,000	
Meyer & Brown, Inc.	Singapore	New York	56,000	
Fred Stern & Co.	Singapore	New York	11,200	
Various	Singapore	New York	519,660	2,759,659
October 4. By the S. S. *Bardic*, at New York.				
Various	London	New York	29,340	29,340
October 4. By the S. S. *West Point*, at New York.				
Various	Pasages	New York	41,085	41,085
October 5. By the S. S. *Eastern Merchant*, at New York.				
J. Aron & Co.	Colombo	New York	20,160	
Chas. T. Wilson Co., Inc.	Colombo	New York	11,400	
W. R. Grace & Co.	Colombo	New York	30,240	
Poel & Kelly	Colombo	New York	6,300	
L. Littlejohn & Co., Inc.	Colombo	New York	45,150	
Hood Rubber Co.	Ceylon	Watertown	6,800	120,050
October 11. By the S. S. *Amazon Maru*, at New York.				
Hood Rubber Co.	Far East	Watertown	302,750	302,750
October 11. By the S. S. *City of Melbourne*, at New York.				
Thornett & Fehr, Inc.	Colombo	New York	72,000	72,000
October 11. By the S. S. *Karimoen*, at New York.				
Aldens' Successors, Inc.	Soerabaya	New York	67,137	
Various	Soerabaya	New York	28,969	
Chas. T. Wilson Co., Inc.	Batavia	New York	11,200	
Fred Stern & Co.	Batavia	New York	312,480	
Peninsular Trading Agency, Inc.	T'jong Priok	New York	19,611	
Aldens' Successors, Inc.	T'jong Priok	New York	476,903	
Various	T'jong Priok	New York	138,108	1,054,408
October 12. By the S. S. *Fushimi Maru*, at Seattle.				
Mitsui & Co., Limited	Singapore	Seattle	43,200	43,200
October 12. By the S. S. *Nieuw Amsterdam*, at New York.				
Meyer & Brown, Inc.	Rotterdam	New York	4.480	4,480
October 13. By the S. S. *Tokiwa Maru*, at New York.				
Mitsui & Co., Limited	Singapore	New York	161,280	
L. Littlejohn & Co., Inc.	Singapore	New York	131,640	
Poel & Kelly	Singapore	New York	112,680	
Fred Stern & Co.	Singapore	New York	33,600	
Various	Singapore	New York	28,740	467,940

PLANTATIONS—Continued

	Shipment from:	Shipped to:	Pounds	Totals
October 14. By the S. S. *City of Canton*, at New York and Boston.				
L. Littlejohn & Co., Inc.	Colombo	New York	112,000	
Meyer & Brown, Inc....	Colombo	New York	4.480	
Hood Rubber Co........	Ceylon	Watertown	19,380	
Chas. T. Wilson Co., Inc.	Colombo	New York	78,400	
Thornett & Fehr, Inc...	Colombo	New York	197,280	
Baring Bros.	Colombo	New York	40,320	
Poel & Kelly..........	Colombo	New York	51,660	
Baird Rubber & Trading Co.	Colombo	New York	102,180	
Various	Colombo	New Yrok	68,180	673,880
October 18. By the S. S. *Carmania*, at New York.				
Various	Liverpool	New York	1,800	1,800
CENTRALS				
September 24. By the S. S. *Cristobal*, at New York.				
Chas. E. Griffin.........	Cristobal	New York	1,500	
Various	Cristobal	New York	600	2,100
September 27. By the S. S. *Helikon*, at New York.				
Various	Jamaica	New York	450	450
October 7. By the S. S. *Lake Copley*, at New York.				
Pablo Calvet & Co......	Cristobal	New York	2,000	2,000
October 8. By the S. S. *Maraval*, at New York.				
Southern Sales Corp....	Trinidad	New York	7,350	7,350
October 11. By the S. S. *Panama*, at New York.				
Ultramares Corp.	Cristobal	New York	750	
Various	Cristobal	New York	1,500	2,250
October 15. By the S. S. *Essequibo*, at New York.				
A. M. Capen's Sons, Inc.	Valparaiso	New York	1,950	1,950
October 15. By the S. S. *Philadelphia*, at New York.				
Scholz & Co............	Venezuelan Ports	New York	2,650	2,650
October 18. By the S. S. *Panuco*, at New York.				
The Steiger Trading Co.	Puerto Mexico	New York	6,300	
Various	Puerto Mexico	New York	1,200	7,500
October 20. By the S. S. *Gen. G. W. Goethals*, at New York.				
Mecke & Co............	Cristobal	New York	2,250	2,250
October 21. By the S. S. *Esperanza*, at New York.				
Coruba Plantation & Trading Co.	Cristobal	New York	1,650	1,650
PONTIANAK				
September 25. By the S. S. *Slavic Prince*, at New York.				
Various	Singapore	New York	124,500	124,500
September 29. By the S. S. *Silitz*, at New York.				
Various	Soerabaya	New York	108,000	108,000
October 1. By the S. S. *Arcturus*, at New York.				
Various	Soerabaya	New York	180,000	180,000
AFRICANS				
September 27. By the S. S. *Rotterdam*, at New York.				
Various	Rotterdam	New York	47,380	47,380
October 13. By the S. S. *Niew Amsterdam*, at New York.				
Various	Rotterdam	New York	2,645	2,645
October 17. By the S. S. *Carmania*, at New York.				
Meyer & Brown, Inc....	Liverpool	New York	11,200	11,200
GUTTA PERCHA				
September 29. By the S. S. *Sommelsdijk*, at New York.				
Various	Belawan-Deli	New York	26,700	26,700
September 29. By the S. S. *Altai Maru*, at New York.				
Various	Batavia	New York	53,100	53,100
October 4. By the S. S. *Lowther Castle*, at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	189,600	
Various	Singapore	New York	63,000	252,600
GUTTAS				
September 8. By the S. S. *Madioen*, at New York.				
The United Malaysian Rubber Co., Limited..	Banjermassin	New York	57,994	57,994
October 2. By the S. S. *Sommelsdijk*, at New York.				
The United Malaysian Rubber Co., Limited..	Banjermassin	New York	73,556	73,556
BALATA				
September 24. By the S. S. *Zecapa*, at New York.				
G. Amsinck & Co., Inc..	Cartagena	New York	1,568	1,568
October 1. By the S. S. *Katahdin*, at New York.				
Middleton & Co., Limited	St. L. du Maroni	New York	17,185	
Antoine Chiris Co......	West Indies	New York	6,095	23,280
October 4. By the S. S. *Dutch Amor*, at New York.				
Middleton & Co., Limited	Port de Paix	New York	6,000	
Wm. Schall & Co.......	Dutch Guiana	New York	24,456	30,456
October 8. By the S. S. *Maraval*, at New York.				
South & Central Am. Comm. Co.	Trinidad	New York	5,850	
Southern Sales Corp....	Trinidad	New York	20,700	
G. Amsinck & Co., Inc..	Trinidad	New York	13,100	39,650
October 15. By the S. S. *Santa Marta*, at New York.				
Various	Cartagena	New York	2,400	2,400
October 15. By the S. S. *Essequibo*, at New York.				
J. S. Sembrada & Co....	Valparaiso	New York	2,811	2,811
October 18. By the S. S. *Guiana*, at New York.				
Middleton & Co., Limited		New York	14,190	14,190
October 20. By the S. S. *Gen. G. W. Goethals*, at New York.				
Various		New York	650	650
GUAYULE				
October 1. By rail at Eagle Pass, Texas.				
Continental - Mexican Rubber Co...........	Mexico	New York	145,000	145,000
October 8. By rail at Eagle Pass, Texas.				
Continental - Mexican Rubber Co...........	Mexico	New York	70,000	70,000

ANTWERP RUBBER ARRIVALS

August 17. By the S. S. *Albertville*, from the Congo.	
Société Anonyme Bungé (Comptoir Colonial Belgika).........*kilos*	22,120
Société Anonyme Bungé (Compagnie du Congo Belge)............	42,490
Société Anonyme Bungé (Plantations Lacourt)..................	1,450
Société Anonyme Bungé (Various)	7,726
Société Coloniale Anversoise (Intertropical)......................	22,640
Société Colonial Anversoise (S. A. B.)........................	3,100
Crédit Colonial & Commercial (Anc. L. & W. Van de Velde). (Compagnie de Kassai)....................................	53,675
Comfina	65,330
Various	31,139
Total	249,670
September 23. By the S. S. *Anversville*, from the Congo.	
Société Anonyme Bungé.....................................*kilos*	23,890
Société Anonyme Bungé..	7,965
Société Anonyme Bungé..	1,800
Société Coloniale Anversoise (Compagnie du Kassai)..............	27,900
	61,555
September 28. By the S. S. *Matasi*, from the Congo.	
Société Anonyme Bungé (Compagnie du Kassai).................	41,160
Sociéeé Anonyme Bungé (Compagnie du Kassai).................	2,117
Société Anonyme Bungé (Compagnie du Kassai).................	9,490
Société Anonyme Bungé..	8,200
Crédit Colonial & Commercial (Anc. L. & W. Vande Velde)......	69,060
Société Coloniale Anversoise................................	20,570
	150,597

Compiled by Grisar & Co., Antwerp.

CUSTOM HOUSE STATISTICS

PORT OF NEW YORK

IMPORTS

	August			
	1919		1920	
Unmanufactured—*free*: Crude rubber:	Pounds	Value	Pounds	Value
From Belgium	....	....	21,243	$10,453
France	129,960	$32,268	....	....
Netherlands	....	....	122,932	50,526
Portugal	....	....	69,237	25,859
England	1,760,940	739,862	1,959,765	793,200
Costa Rica	5,808	3,147	1,623	325
Nicaragua	....	....	23,615	10,573
Trinidad	145,342	34,113	....	....
Honduras	1,379	450	....	....
Panama	1,200	690	1,530	918
Argentina	27,269	9,294	....	....
Mexico	5,466	1,576	19,133	4,649
Bolivia	36,553	12,745	15,000	5,643
Brazil	2,598,977	741,892	1,317,139	325,547
Colombia	410	167	242,994	67,624
Uruguay	....	....	10,911	3,409
Ecuador	....	....	10,900	2,420
Peru	244,438	104,489	114,405	25,095
Venezuela	83,976	36,917	....	....
British India	11,200	3,808	270,000	97,516
Dutch Guiana ...	31,306	23,626	....	....
Straits Settlements	10,375,023	4,437,138	26,191,776	12,322,176
British E. Indies.	2,192,867	898,694	4,052,341	1,787,894
Dutch E. Indies.	35,750	13,708	3,985,146	1,686,826
Hongkong	....	....	22,348	12,538
China	....	....	44,450	23,680
Japan	19,500	8,808	929,600	385,610
British Oceania..	....	....	959	367
Philippine Islands	....	....	15,540	5,400
British E. Africa	....	....	7,733	3,136
Totals	17,707,364	$7,103,392	39,450,320	$17,651,384
Jelutong (Pontianak): From Straits Settlements	798,999	$79,622	1,825,936	$396,120
Dutch E. Indies.	....	....	1,048,965	143,987
Totals	798,999	$79,622	2,874,901	$540,107
Gutta percha: From Straits Settlements	315,971	$65,601	1,109,613	$312,937
Dutch E. Indies.	....	....	301,178	56,511
Totals	315,971	$65,601	1,410,791	$369,448
Balata: From England	11,349	$11,723	....	....
Panama	17,712	8,124	455	$110
Colombia	25,147	11,762	3,960	1,774
British Guiana...	22,806	17,557	11,130	6,439
Dutch Guiana...	18,320	16,648	25,677	17,655
Venezuela	43,769	27,328	....	....
Totals	139,103	$93,142	41,222	$25,978
Reclaimed and scrap rubber	253,060	$30,058	391,133	$59,588
Totals, unmanufactured	19,214,497	$7,371,815	44,168,367	$18,646,505
Manufactures of rubber and gutta percha	....	$41,855	....	$130,068
Rubber substitutes.*dutiable*	18,816	3,127	....	....
Chicle ....*dutiable*	245,052	128,560	264,911	181,647
Totals	263,868	$173,542	264,911	$311,715

EXPORTS OF DOMESTIC MERCHANDISE

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured:				
Automobile tires	....	$1,959,258	....	$2,040,577
Inner tubes	....	....	....	211,916
Solid tires	....	....	....	166,232
All other tires	....	83,936	....	36,576
Belting	....	421,107	....	170,557
Hose	....	....	....	133,908
Packing	....	....	....	48,029
Rubber boots ......*pairs*	8,480	24,921	5,340	18,530
Rubber shoes ......*pairs*	280,445	218,529	364,860	351,208
Soles and heels	....	....	....	42,853
Druggists' sundries	....	65,384	....	94,928
Other mfrs. of rubber	....	475,717	....	275,869
Totals, manufactured	288,925	$3,248,852	370,200	$3,591,183
Insulated wire	....	637,346	....	261,911
Fountain pens....*number*	14,076	17,365	17,024	21,445
Suspenders and garters	....	193,761	....	221,581
Chewing gum	....	188,848	....	109,592
Totals	14,076	$1,037,320	17,024	$614,529
Unmanufactured—*free:*				
Reclaimed and scrap rubber	546,925	$64,858	106,466	$12,515

FOREIGN EXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Crude rubber	16,870	$8,018	336,809	$137,257
Balata	5,900	2,065	99,778	50,640
Chicle	....	....	309	220
Rubber substitutes	305	155	....	....
Rubber scrap	....	....	224,300	44,831

PORT OF BOSTON

IMPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Unmanufactured—*free.*				
Crude rubber:				
From Straits Settlements	......	......	7,000	$3,114
British East Indies	......	......	93,311	21,562
Totals	......	......	100,311	$24,676
Gutta percha	......	......	......	......
Rubber scrap and reclaimed	591	44	96,839	$6,413
Rubber manufactures...*dutiable*	......	......	......	90,184

EXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured:				
Automobile tires	......	$19,689	......	$6,910
Inner tubes	......	......	......	11,269
Other tires	......	......	......	506
Belting	......	4,603	......	3,007
Hose	......	......	......	1,291
Packing	......	......	......	184
Rubber boots ......*pairs*	19,122	43,860	3,786	11,526
Rubber shoes ......*pairs*	293,218	169,794	86,145	87,662
Soles and heels	......	......	......	7,114
Druggists' sundries	......	3,621	......	3,980
Other rubber manufactures	......	83,530	......	64,812
Totals	31,2,340	$325,097	89,931	$198,261
Insulated wire	......	$149	......	$15,820
Fountain pens	......	......	......	......
Suspenders and garters	......	29,702	......	22,914
Rubber scrap	80,477	7,977	1,571	550

PORT OF NEW ORLEANS

IMPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured—*free:*				
Crude rubber:				
From Nicaragua	1,100	$281	1,464	$298
Honduras	....	....	670	154
Totals	1,100	$281	2,134	$452
Chicle	6,191	$3,567	....	....

EXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured:				
Automobile tires	....	$8,287	....	$57,906
Inner tubes	....	....	....	7,292
Solid tires	....	....	....	248
All other tires	....	219	....	43
Belting	....	2,858	....	2,299
Hose	....	....	....	11,366
Packing	....	....	....	2,707
Rubber boots ......*pairs*	....	....	2	9
Rubber shoes ......*pairs*	8,826	9,169	13,557	15,805
Soles and heels	....	....	....	1,130
Druggists' sundries	....	256	....	11
Other rubber manufactures	....	1,960	....	2,393
Totals	....	$22,749	13,559	$101,209
Insulated wire	....	$1,344	....	$10,688
Fountain pens	85	142	....	....
Suspenders	....	2,703	....	4,649
Chewing gum	....	2,041	....	1,374
Scrap	276	60	....	....

PORT OF SEATTLE

IMPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Unmanufactured—*free:*				
Crude rubber:				
From Canada	11,350	$405	....	....
Straits Settlements	825,294	324,991	223,000	$75,847
Dutch E. Indies.	9,100	3,185	....	....
Hongkong	160,200	80,100	....	....
Japan	....	....	89,760	32,328
Totals	1,005,944	$408,681	312,760	$108,175
Jelutong (Pontianak)	66,000	$6,600	....	....
Rubber manufactures	....	320	....	....

EXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured:				
Automobile tires	....	$41,737	....	$50,168
Inner tubes	....	....	....	6,036
Solid tires	....	....	....	1,203
All other tires	....	3,268	....	56
Belting	....	4,575	....	29,146
Hose	....	....	....	10,317
Packing	....	....	....	16,999
Rubber boots ......*pairs*	537	1,716	242	980
Rubber shoes ......*pairs*	3,586	5,522	2	2
Druggists' sundries	....	2,436	....	80
Other rubber manufactures	....	6,538	....	3,347
Totals	4,123	$65,792	244	$118,334
Insulated wire	....	$1,085	....	$119
Fountain pens ...*number*	156	83	60	45
Suspenders	....	1,517	....	1,288
Chewing gum	....	103	....	120
Reclaimed rubber	....	....	1,065	32

REEXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Crude rubber	....	....	1,000	376

PORT OF SAN FRANCISCO

IMPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Unmanufactured—*free:*				
Crude rubber:				
From Straits Settlements	3,415,180	$1,138,702	....	....
Canada	971	413	1,033,170	$656,945
Totals	3,416,151	$1,139,115	1,033,170	$656,945
Jelutong (Pontianak)	20,235	$1,214	....	....
Rubber manufactures	....	1,017	....	$1,581

EXPORTS

	August 1919 Pounds	August 1919 Value	August 1920 Pounds	August 1920 Value
Manufactured:				
Automobile tires	....	$120,384	....	$112,267
Inner tubes	....	....	....	8,897
Solid tires	....	....	....	14,494
All other tires	....	547	....	356
Belting	....	48,779	....	49,342
Hose	....	....	....	11,111
Packing	....	....	619	78
Rubber boots ......*pairs*	48	137	....	....
Rubber shoes ......*pairs*	4,674	3,805	1,944	2,213
Soles and heels	....	....	....	6,484
Druggists' sundries	....	2,977	....	4,743
Other rubber manufactures	....	37,564	....	18,012
Totals	4,722	$214,193	2,563	$227,997
Insulated wire	....	$71,382	....	$6,910
Fountain pens....*number*	3,188	3,011	1,364	3,0 0
Suspenders	....	3,733	....	6,728
Chewing gum	....	3,188	....	2,298
Unmanufactured—*free:*				
Reclaimed and scrap rubber	51,658	$2,066	....	....

EXPORTS OF INDIA RUBBER AND CAUCHO FROM MANAOS DURING AUGUST, 1920

Exporters	Europe Fine	Europe Medium	Europe Coarse	Europe Caucho	Europe Totals	New York Fine	New York Medium	New York Coarse	New York Caucho	New York Totals	Grand Totals
General Rubber Co. of Brazil.*kilos*	86,540	16,218	8,142	26,100	137,000	258,295	17,920	32,019	76,766	385,000	522,000
Tancredo, Porto & Co.	116,964	9,893	622	86	127,565	55,137	6.647	26,606	17,287	105,677	233,242
Stowell & Co.	39,980	1,920	800	9,760	52,460	35,348	1,197	21,950	30,750	89,245	141,705
Semper & Co.	24,148	835	8,856	7,931	41,770	....	....	....	....	....	41,770
Ohliger & Co.	9,036	778	7,943	7,060	24,817	5,425	....	....	....	5,425	30,242
Companhia Fluvial	21,925	....	....	....	21,925	....	....	....	....	....	21,925
Gomes & Co.	9,180	340	150	....	9,670	....	....	....	....	....	9.670
Pedro Manoel Fuentes	....	....	....	....	....	5,166	....	3,441	....	8,607	8,607
J. G. Araujo	....	....	....	1,120	1,120	....	....	....	....	....	1,120
Totals from Manáos......*kilos*	307,773	29,984	26,513	52,057	416,327	359,371	25,764	84,016	124,803	593,954	1,010,281
In transit from Iquitos	....	....	....	....	....	10,052	23,453	1,997	35,742	71,244	71,244
Totals ......*kilos*	307,773	29,984	26,513	52,057	416,327	369,423	49,217	86,013	160,545	665,198	1,081,525

Compiled by Stowell & Co., Manáos, Brazil.

EXPORTS OF INDIA RUBBER MANUFACTURES AND INSULATED WIRE AND CABLE FROM THE UNITED STATES BY COUNTRIES, DURING THE MONTH OF AUGUST, 1920

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires: Casings Value	Automobile Tires: Inner Tubes Value	Automobile Tires: Solid Tires Value	Automobile Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
EUROPE:																
Austria	......	......	......	......	......	......	......	......	$3,200	$100	......	......	......	......	......	$3,300
Belgium	$388	......	$1,680	......	......	9,288	$9,170	......	68,004	10,354	......	......	$1,090	$20	......	90,706
Denmark	828	$1,315	1,368	5	$22	11,160	8,649	$2,089	94,689	6,393	$1,398	$7,471	8,623	1,208	$9,531	143,584
Finland	1,357	......	......	......	......	......	......	......	......	......	......	......	......	......	75	1,432
France	658	......	......	......	......	......	......	......	19,683	84	20,987	......	1,158	......	14,474	57,044
Germany	525	......	......	......	......	......	......	......	30,189	10,016	......	......	......	......	800	41,530
Greece	3,534	903	......	......	......	75	62	......	13,545	4,708	......	......	1,040	162	765	24,719
Italy	......	......	482	48	140	20,676	17,907	3,670	45,804	6,435	......	......	1,320	......	8,501	84,259
Malta, Gozo, and Cyprus Is.	......	......	......	......	......	......	......	......	343	8	......	......	......	......	3	354
Netherlands	......	11,893	......	......	......	1,632	843	......	7,113	1,033	......	......	13,884	2,480	3,678	40,924
Norway	1,364	2,124	300	......	......	39,796	33,378	......	50,347	2,208	15,675	......	3,439	......	2,279	111,114
Portugal	......	......	......	......	......	......	......	......	38,719	2,290	150	......	6,256	361	253	48,029
Roumania	112	98	......	......	......	......	......	......	117,952	580	......	......	86	......	......	118,828
Spain	2,194	3,865	1,067	......	......	38,248	37,211	1,065	126,232	15,268	24,782	497	5,773	794	5,458	224,206
Sweden	4,118	6,425	13,803	33	136	1,522	1,949	......	167,746	25,880	12,365	2,397	6,742	4,007	7,947	253,515
Switzerland	90	......	......	420	1,094	42,008	38,796	......	37,127	6,017	......	......	......	......	3,273	86,397
Turkey in Europe	......	913	......	......	......	48,699	44,444	......	3,351	461	......	......	......	......	433	49,602
England	14,139	28,338	2,947	1,626	4,639	20,720	22,778	4,506	279,906	16,444	6,416	3,927	9,659	18,215	145,534	557,448
Scotland	......	......	1,696	300	595	7,716	6,731	......	5,356	191	......	597	......	......	......	15,166
Ireland	10,778	......	......	......	......	......	......	......	......	......	......	......	......	......	......	10,778
Yugoslavia, Albania, etc.	......	......	......	......	......	......	......	......	578	118	......	......	......	......	......	696
TOTALS, EUROPE	$40,085	$55,874	$23,343	2,432	$6,626	241,540	$221,918	$11,330	$1,109,884	$108,588	$81,773	$14,889	$59,070	$27,247	$203,004	$1,963,631
NORTH AMERICA:																
Bermuda	......	$10	......	......	......	259	$391	$52	......	......	......	......	$1,999	......	$44	$2,496
British Honduras	......	52	$134	1	$3	1,963	2,731	105	$772	$256	......	$43	292	$9	110	4,507
Canada	$18,414	11,517	6,192	1,667	6,895	2,622	6,214	1,277	212,148	25,162	$17,259	5,983	42,819	21,834	212,279	587,993
Costa Rica	106	241	46	1	6	144	163	854	850	16	......	......	4,185	380	739	7,586
Guatemala	......	87	......	......	......	......	......	......	30	......	218	......	90	79	5	509
Honduras	629	3,468	349	......	......	236	332	78	864	24	593	......	804	......	279	7,420
Nicaragua	1,291	147	92	......	......	301	254	420	1,290	230	......	......	1,015	196	284	5,219
Panama	2,744	5,115	1,533	60	201	823	1,117	2,511	96,824	12,706	546	63	16,561	634	2,135	142,690
Salvador	430	261	75	......	......	......	......	918	283	66	484	......	736	78	24	3,355
Mexico	62,099	42,520	11,550	16	64	22,258	23,903	1,351	79,540	11,860	5,298	2,813	30,669	7,004	21,090	299,761
Miquelon, Langley, etc.	......	......	......	912	3,221	......	......	......	......	......	......	......	......	......	......	3,221
Newfoundland and Labrador	3,247	918	264	5,681	20,629	1,231	2,330	356	3,236	508	291	748	208	139	2,256	35,130
Barbados	1,270	285	......	......	......	462	823	190	138	8	......	136	300	......	278	3,428
Jamaica	13	703	......	......	......	354	641	107	2,463	59	......	......	......	112	1,056	5,154
Trinidad and Tobago	1,541	966	285	......	......	19,388	16,882	369	10,607	824	......	474	778	277	453	33,456
Other British West Indies	181	15	......	......	......	712	823	249	3,561	405	262	55	231	5	277	6,064
Cuba	7,783	26,347	18,435	565	2,884	89,866	88,229	12,250	270,073	24,007	41,259	1,305	58,673	7,514	16,340	575,099
Virgin Islands of U. S.	......	1.632	......	......	......	2,545	3,999	506	3,454	772	......	54	18	......	240	10,675
Dutch West Indies	......	......	......	......	......	250	312	......	2,579	3,413	......	67	21	25	77	6,494
French West Indies	18	......	......	......	......	......	......	......	1,120	50	1,030	......	......	......	......	2,218
Haiti	55	75	......	......	......	36	41	205	10,445	1,784	......	85	8,415	30	741	21,876
Dominican Republic	1,112	1,402	147	......	......	2,050	2.315	571	23,104	3,667	1,512	2,755	605	1,359	3,874	42,423
TOTALS, NORTH AMERICA	$100,933	$95,761	$39,102	8,903	$33,903	145,500	$151,500	$22,369	$723,381	$85,817	$68,752	$14,581	$168,419	$39,675	$262,581	$1,806,774
OCEANIA:																
Australia	$11,891	$140	$499	......	......	8,795	$7,322	$400	$12,780	$3,211	$1,000	......	$3,856	$7,910	$4,221	$53,230
New Zealand	4,912	657	......	......	......	1,224	1,159	......	85,573	4,946	6,200	$3,169	255	1,006	3,163	111,040
French Oceania	......	18	......	......	......	......	......	......	96	18	......	70	......	......	28	230
Other Oceania	......	......	......	......	......	......	......	......	......	......	......	......	......	......	171	171
Philippine Islands	2,516	6,612	923	252	$362	13,282	19,260	10,103	80,146	4,933	13,028	1,410	26,348	2,693	20,521	188,855
TOTALS, OCEANIA	$19,319	$7,427	$1,422	252	$362	23,301	$27,741	$10,503	$178,595	$13,108	$20,228	$4,649	$30,459	$11,609	$28,104	$353,526
SOUTH AMERICA:																
Argentina	$45,896	$10,494	$1,390	......	......	11,299	$11,413	$177	$169,349	$26.354	......	$7,757	$9,808	$13,657	$16.438	$312,733
Bolivia	......	300	......	......	......	......	......	9	697	310	......	......	46	296	......	1,658
Brazil	10,182	5,522	2,028	62	$275	18,790	19,574	12,835	189,740	9,886	$29,955	56	54,705	8,465	46.254	389,477
Chile	1,003	2,378	1,220	......	......	480	545	780	8,589	1,828	6,152	......	2,853	1,295	3,636	30,279
Colombia	450	1,195	275	......	......	61	80	2,186	10,929	1,451	......	440	4,878	1,921	1,967	25,772
Ecuador	252	......	......	......	......	5,672	4,629	......	11,551	745	......	......	......	1,747	568	19,492
British Guiana	......	......	83	......	......	4,982	7,879	......	11,428	354	505	......	316	6	113	20.684
Dutch Guiana	......	......	5	......	......	148	186	......	......	......	......	......	35	......	212	438
Paraguay	680	......	......	......	......	......	......	......	......	......	......	......	......	45	......	725
Peru	1,843	566	245	108	918	480	818	......	14,060	1,923	1,470	......	3,251	1,145	2,278	28,517
Uruguay	......	3,044	......	......	......	516	482	3,478	22,888	5,378	700	......	1.012	1,643	4,504	43,129
Venezuela	365	454	102	......	......	......	......	519	24,344	2,817	......	504	183	3,672	2,016	34,976
TOTALS, SOUTH AMERICA	$60,671	$23,953	$5,348	170	$1,193	42,428	$45,606	$19,984	$463,575	$51,046	$38,782	$8,757	$77,087	$33,892	$77,986	$907,880

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires: Casings Value	Automobile Tires: Inner Tubes Value	Automobile Tires: Solid Tires Value	Automobile Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
ASIA:																
Aden	......	......	......	......	......	13	$21	......	$5,570	$931	......	......	......	......	......	$6,522
China	......	$153	......	......	......	842	909	......	3,039	366	......	$31	$52,240	$8,773	$5,394	70,905
Kwantung Leased Territory	......	234	......	......	......	......	......	......	......	......	......	......	......	......	......	234
Chosen	......	......	......	......	......	......	......	......	64	......	......	......	......	16	......	80
British India	$7,715	10,004	$2,987	......	......	608	664	......	82,117	6,889	$2,294	646	20,389	4,200	4,913	142,818
Straits Settlements	......	......	104	......	......	48	34	......	76,239	4,725	2,000	61	56	2,054	275	85,548
Other British East Indies	......	......	......	......	......	......	......	......	2,968	672	......	......	14	24	......	3,678
Dutch East Indies	......	100	......	......	......	168	176	......	78,128	8,421	45,402	2,170	3,707	731	3,300	142,135
French Indo China	......	......	......	......	......	......	......	......	......	......	638	......	......	......	66	704
Hongkong	......	717	......	......	......	72	111	......	2,900	......	......	......	4,876	......	195	8,799
Japan	35,387	11,760	18,455	2,366	$6,896	27,510	25,444	$23	50,971	6,742	3,985	8,103	3,505	38	4,025	175,334
Russia in Asia	......	......	......	......	......	......	......	......	......	449	......	......	......	......	......	449
Siam	......	......	......	......	......	239	321	......	......	......	......	30	......	125	10	486
Turkey in Asia	......	......	......	......	......	2,016	2,621	......	3,549	558	......	......	......	175	251	7,154
TOTALS, ASIA	$43,102	$22,968	$21,546	2,366	$6,896	31,516	$30,301	$23	$305,545	$29,753	$54,319	$11,041	$84,787	$16,136	$18,429	$644,846
AFRICA:																
British South Africa	$58,503	$45,824	$12,519	132	$416	4,161	$4,025	$1,755	$287,631	$29,681	$895	......	......	$592	$9,904	$451,745
British East Africa	......	......	......	......	......	......	......	......	13,657	2,202	......	......	$386	......	1	16,246
Canary Islands	......	......	......	......	......	......	......	......	707	35	800	......	......	......	......	1,542
Portuguese Africa	......	......	447	......	......	......	......	......	21,386	5,357	......	$14	......	9	45	27,258
Egypt	......	......	......	......	......	192	369	......	17,169	1,422	......	......	......	678	901	20,539
TOTALS, AFRICA	$58,503	$45,824	$12,966	132	$416	4,353	$4,394	$1,755	$340,550	$38,697	$1,695	$14	$386	$1,279	$10,851	$517,330
TOTALS	$322,613	$251,807	$103,727	14,255	$49,396	488,638	$481,460	$65,964	$3,121,530	$327,009	$265,549	$53,931	$420,208	$129,838	$600,955	$6,193,987

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORY OF THE UNITED STATES

	Belting, Hose and Packing Value	Boots and Shoes Pairs	Boots and Shoes Value	Tires: Automobile Value	Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All other Manufactures of Rubber Value	Totals Value
Hawaii	$13,254	....	....	$167,451	$3,834	....	....	$30,364	$214,903
Porto Rico	9,108	....	....	158,253	1,211	....	....	52,967	221,539
TOTALS	$22,362	....	....	$325,704	$5,045	....	....	$83,331	$436,442

Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.

OFFICIAL INDIA RUBBER STATISTICS FOR THE UNITED STATES

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—*free:*				
India rubber:				
From France	......	......	197,165	$67,798
Netherlands	......	......	692,369	280,188
Portugal	......	......	509,146	169,974
United Kingdom	678,016	$310,552	3,397,894	1,481,125
Canada	174,362	80,194	340	133
Central America	27,956	9,265	33,989	9,243
Mexico	1,155	252	154,102	31,330
Brazil	2,055,583	579,257	3,529,968	920,488
Peru	......	......	635,093	220,873
Other South Am.	179,562	67,963	236,726	73,691
British E. Indies	40,109,576	16,390,865	24,711,293	11,622,235
Dutch E. Indies	8,707,707	3,602,738	11,018,052	4,974,481
Other countries	703,891	271,183	338,300	131,000
Totals	52,637,808	$21,312,269	45,454,437	$19,982,559
Balata	105,432	86,104	43,293	25,590
Guayule	285,548	67,453	......	......
Jelutong (Pontianak)	4,000,945	437,606	1,525,057	245,844
Gutta percha	1,264,364	200,032	844,952	190,108
Rubber scrap	1,014,464	71,799	1,349,283	120,092
Totals, manufactured	59,308,561	$22,175,263	49,217,022	$20,564,193
Chicle (dutiable)	795,190	$530,146	1,125,401	$777,897
MANUFACTURED—*dutiable:*				
India rubber and gutta percha	......	$52,776	......	$162,368
India rubber substitutes	16	6	20	61

EXPORTS OF DOMESTIC MERCHANDISE

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—				
India rubber:				
Scrap and old	752,599	$78,107	360,857	$27,585
Reclaimed	467,139	78,897	378,851	65,364
Belting[1]	......	400,377	......	308,588
Hose[1]	......		......	248,502
Packing[1]	......		......	140,965
Boots[1] ...pairs	20,396	59,409	18,289	64,592
Shoes[1] ...pairs	131,412	114,436	667,754	680,518
Soles and heels[1]	......	......	......	113,371
Tires:				
For automobiles[1]	......	1,569,967	......	......
Casings[1]	......		......	4,269,123
Inner tubes[1]	......		......	473,413
Solid tires[1]	......		......	265,745
All other tires[1]	......	38,816	......	151,160
Druggists' rubber sundries[1]	......	74,733	......	188,921
Suspenders and garters	......	186,175	......	374,398
Other rubber manufactures[1]	......	481,692	......	755,487
Totals, manufactured	1,371,546	$3,082,609	1,425,751	$8,127,732
Fountain pens....*number*	53,490	$51,542	33,011	$32,495
Insulated wire and cables[1]	......	659,893	......	558,791

EXPORTS OF FOREIGN MERCHANDISE

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—				
India rubber	437,414	$199,046	282,860	$97,544
Balata	44,657	20,599	27,700	15,675
Guayule	......	......	1,666	1,083
Jelutong (Pontianak)	23,280	3,492	56,000	6,020
Rubber scrap	......	......	1,875	169
Totals, unmanufactured	505,351	$223,137	370,101	$120,491
MANUFACTURED—				
Gutta percha	......	$3,550	......	$258
Totals, manufactured	......	$3,550	......	$258
India rubber substitutes	......	......	2,450	$1,052
Chicle	......	......	11,020	1,112

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
MANUFACTURED—				
To Alaska:				
Belting, hose and packing	......	$8,678	......	$10,648
Boots and shoes.*pairs*	5,721	15,574	12,333	32,635
Other rubber goods	......	6,657	......	14,289
Totals	5,721	$30,909	12,333	$57,572
To Hawaii:				
Belting, hose and packing	......	$6,740	......	$14,644
Automobile tires	......	43,811	......	137,031
Other tires	......	1,841	......	2,563
Other rubber	......	11,333	......	14,731
Totals	......	$63,725	......	$168,969
To Porto Rico:				
Belting, hose and packing	......	$3,761	......	$9,447
Automobile tires	......	132,865	......	230,738
Other tires	......	1,348	......	24,187
Other rubber goods	......	21,754	......	55,583
Totals	......	$159,728	......	$319,955

To Philippine Islands—treated as foreign commerce.

[1]Details of exports of domestic merchandise by countries during July, 1920, are given on pages 68-69 of October issue.

UNITED STATES CRUDE RUBBER IMPORTS FOR 1920 (BY MONTHS)

1920	Plantations	Parás	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Balata	Miscellaneous Gum	Waste	Totals 1920	Totals 1919
January ....tons	17,799	2,620	821	111	....	....	....	....	....	21,351	7,235
February	29,681	2,456	558	265	34	....	....	....	....	32,994	17,456
March	28,533	2,463	514	23	114	3	113	983	1,252	33,998	28,223
April	21,036	1,893	628	29	79	10	22	812	448	24,957	28,146
May	24,443	2,025	662	95	113	....	45	1,059	224	28,666	16,348
June	12,911	1,352	427	27	164	....	7	552	164	15,604	16,319
July	14,695	1,115	34	40	....	....	8	1,283	312	17,487	17,965
August	12,730	590	13	75	156	....	67	1,135	300	15,066	11,067
September	10,974	459	99	8	74	22	44	516	218	12,414	14,036
Totals, 9 months, 1920	172,802	14,973	3,756	673	734	35	306	6,340	2,918	202,537	156,795
Totals, 9 months, 1919	131,853	20,060	2,036	1,136	1,453	257	....	....	....	....	156,795

Compiled by The Rubber Association of America, Inc.

Official India Rubber Statistics for the United States

CALENDAR YEAR 1919

INDIA RUBBER

IMPORTS OF CRUDE INDIA RUBBER BY COUNTRIES (FREE)

From—	Pounds	Value
Europe—		
Belgium	655,001	$272,499
France	2,410,319	752,579
Netherlands	2,637,665	1,276,060
Portugal	87,422	24,470
United Kingdom—		
England	60,159,954	28,657,525
Scotland	91,940	29,975
Totals, Europe	66,042,301	$31,013,108
North America—		
British Honduras	454	$113
Canada	5,320,540	2,530,295
Central American States—		
Costa Rica	35,332	14,337
Guatemala	12,289	3,336
Honduras	17,038	5,648
Nicaragua	267,378	78,482
Panama	89,127	33,884
Salvador	27,209	16,346
Mexico	963,242	306,307
West Indies—		
British—		
Trinidad and Tobago	161,925	41,400
Other British	1,235	375
Haiti	1,000	400
Totals, North America	6,896,769	$3,030,923
South America—		
Argentina	96,240	$44,616
Bolivia	268,253	110,931
Brazil	58,845,384	20,828,269
Chile	56,357	28,072
Colombia	699,790	273,975
Ecuador	476,225	139,265
Guiana—		
British	18,930	15,920
Dutch	31,306	28,626
Peru	4,567,002	1,501,854
Uruguay	230,076	140,364
Venezuela	521,573	219,193
Totals, South America	65,811,136	$23,331,085
Asia—		
China	296,172	$131,582
East Indies—		
British—		
India	4,896,061	2,077,192
Straits Settlem'ts	267,295,344	105,788,564
Other	57,432,831	23,786,387
Dutch	61,260,330	24,600,493
Hongkong	994,968	374,795
Japan	2,808,888	1,095,496
Totals, Asia	394,984,594	$157,854,509
Oceania—		
Philippine Islands	983,987	$394,507
Africa—		
Belgian Congo	67,020	$12,686
British West Africa	858,688	129,516
French Africa	295,926	53,779
Totals, Africa	1,221,634	$195,981
Calendar year, 1919	535,940,421	$215,820,113
Calendar year, 1918	325,959,308	146,378,313
Fiscal year, 1917-18	389,599,015	202,800,392
Fiscal year, 1916-17	333,373,711	189,328,674
Fiscal year, 1915-16	267,775,557	155,044,790
Fiscal year, 1914-15	172,068,428	$83,030,269
Fiscal year, 1913-14	131,995,742	71,219,851
Fiscal year, 1912-13	113,384,359	90,170,316
Fiscal year, 1911-12	110,210,173	93,013,255
Fiscal year, 1910-11	72,046,260	76,244,603
Fiscal year, 1909-10	101,044,681	101,078,825
Fiscal year, 1908-09	88,359,895	61,709,723
Fiscal year, 1907-08	62,233,160	36,613,185
Fiscal year, 1906-07	76,963,838	58,919,981
Fiscal year, 1905-06	57,844,345	45,114,450

IMPORTS OF CRUDE INDIA RUBBER BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
Massachusetts	3,097,900	$905,747
New York	368,146,386	150,168,723
New Orleans	130,693	40,715
Arizona	982	297
San Antonio	280,068	87,733
San Francisco	60,209,143	23,787,035
Southern California	12,908	4,293
Washington	64,556,132	26,027,058
Buffalo	1,674,851	815,505
Dakota	6,982,443	2,788,318
Michigan	3,053,100	977,903
Ohio	26,900,838	9,838,974
St. Lawrence	121,019	52,071
Vermont	640,793	275,681
Colorado	133,165	50,060
Calendar year, 1919	535,940,421	$215,820,113

IMPORTS OF MANUFACTURES OF INDIA RUBBER AND GUTTA PERCHA BY COUNTRIES (DUTIABLE)

[+ indicates increase; — indicates decrease, compared with the preceding year.]

From—	Value
Europe—	
Belgium	$214+
France	5,668+
Germany	43+
Gibraltar	1+
Italy	298—
United Kingdom—	
England	480,642+
Scotland	30,542+
Ireland	164—
Total, Europe	$517,572
North America—	
Canada	$406,947+
West Indies—	
British—	
Barbados	10+
Cuba	343+
Total, North America	$407,300
South America—	
Argentina	$337+
Brazil	71+
Venezuela	230+
Total, South America	$638
Asia—	
China	$2
Hongkong	9
Japan	30,550
Total, Asia	$30,561
Oceania—	
Australia	$14+
Total, Calendar year, 1919	$956,085
Total, Calendar year, 1918	445,332

	Gutta Percha	India Rubber
Fiscal year, 1917-18	$16,978	$599,763
Fiscal year, 1916-17	173,975	608,954
Fiscal year, 1915-16	57,875	398,020
Fiscal year, 1914-15	10,841	791,281
Fiscal year, 1913-14	42,023	1,517,789
Fiscal year, 1912-13	77,300	1,217,236
Fiscal year, 1911-12	41,098	874,736
Fiscal year, 1910-11	61,283	875,125
Fiscal year, 1909-10	80,567	1,154,347
Fiscal year, 1902-09	71,819	1,391,770
Fiscal year, 1907-08	93,545	1,956,590

IMPORTS OF MANUFACTURES OF INDIA RUBBER AND GUTTA PERCHA BY CUSTOMS DISTRICTS (DUTIABLE)

At—	Value
Maine and New Hampshire	$965
Maryland	2,132
Massachusetts	39,442
New York	528,957
Philadelphia	1,269
Rhode Island	637
South Carolina	71
Florida	138
Mobile	10
New Orleans	111
Hawaii	3,238
Oregon	17
San Francisco	14,651
Southern California	164
Washington	1,165
Buffalo	245,428
Chicago	85,186
Dakota	295
Michigan	13,135
Montana and Idaho	205
Ohio	10,053
Rochester	43
St. Lawrence	2,520
Vermont	312
Wisconsin	921
Minnesota	5
Pittsburgh	4,854
St. Louis	161
Total	$956,085

REEXPORTS OF IMPORTED CRUDE INDIA RUBBER

To—	Pounds	Value
Austria	179,952	$77,992
Denmark	65,050	32,500
France	7,575	4,800
Germany	322,650	135,310
Norway	525	336
Spain	1,900	857
Sweden	150	280
Switzerland	357	209
United Kingdom—England	39,550	14,343
Canada	4,142,665	1,752,034
Mexico	146,567	67,700
Cuba	71,707	33,927
Chile	1,355	938
Japan	28,652	19,360
Australia	103,131	65,043
Calendar year, 1919	5,111,786	$2,205,629
Calendar year, 1918	6,150,755	3,133,622
Fiscal year, 1917-18	8,208,280	4,274,543
Fiscal year, 1916-17	12,355,898	7,304,820
Fiscal year, 1915-16	4,662,889	2,661,331
Fiscal year, 1914-15	6,383,145	3,361,107
Fiscal year, 1913-14	3,747,749	2,398,150
Fiscal year, 1912-13	5,272,387	4,476,379
Fiscal year, 1911-12	5,610,951	4,890,905
Fiscal year, 1910-11	5,267,588	5,439,281
Fiscal year, 1909-10	6,492,947	7,629,380
Fiscal year, 1908-09	3,791,971	2,964,496
Fiscal year, 1907-08	4,110,667	2,994,208
Fiscal year, 1906-07	4,215,350	3,593,912

REEXPORTS OF MANUFACTURES OF INDIA RUBBER AND GUTTA PERCHA

To—	Value
Denmark	$8,200
Sweden	5,538
United Kingdom—England	21,571
Canada	2,570
Mexico	40
Cuba	1,040
Chile	188
Venezuela	85
Japan	511
Calendar year, 1919	$39,743
Calendar year, 1918	40,101

	Gutta Percha	India Rubber
Fiscal year, 1917-18	$18,216	$13,563
Fiscal year, 1916-17	421	10,905
Fiscal year, 1915-16	537	38,649
Fiscal year, 1914-15	....	7,489
Fiscal year, 1913-14	....	7,638
Fiscal year, 1912-13	....	7,973
Fiscal year, 1911-12	65	6,681
Fiscal year, 1910-11	8,687	29,356
Fiscal year, 1909-10	....	13,568
Fiscal year, 1908-09	....	36,401
Fiscal year, 1907-08	....	176,129
Fiscal year, 1906-07	....	32,712

GUTTA PERCHA

IMPORTS OF CRUDE GUTTA PERCHA BY COUNTRIES (FREE)

From—	Pounds	Value
Europe—		
France	44,800	$9,311
United Kingdom— England	256,914	54,219
Totals, Europe	301,714	$63,530
North America— Canada	58,393	$17,580
Asia— East Indies— British— Straits Settlem'nts	4,576,880	$764,907
Dutch	1,286,069	184,477
Japan	200	40
Totals, Asia	5,863,149	$949,424
Oceania— Philippine Islands	7,491	$1,750
Africa— British— West Africa	265,071	$36,414
Calendar year, 1919	6,495,818	$1,068,698
Calendar year, 1918	1,207,986	225,922
Fiscal year, 1917-18	1,151,312	147,323
Fiscal year, 1916-17	2,021,794	332,223
Fiscal year, 1915-16	3,188,449	342,226
Fiscal year, 1914-15	1,618,214	230,750
Fiscal year, 1913-14	1,846,109	323,567
Fiscal year, 1912-13	480,853	167,313
Fiscal year, 1911-12	1,204,406	225,797
Fiscal year, 1910-11	1,648,921	390,548
Fiscal year, 1909-10	784,501	167,873
Fiscal year, 1908-09	255,559	82,136
Fiscal year, 1907-08	188,610	100,305
Fiscal year, 1906-07	546,890	201,339
Fiscal year, 1905-06	500,770	188,161

IMPORTS OF CRUDE GUTTA PERCHA BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
New York	6,131,188	$988,971
San Francisco	195,833	48,867
Washington	168,193	30,663
Michigan	604	197
Calendar year, 1919	6,495,818	$1,068,698

REEXPORTS OF CRUDE GUTTA PERCHA

To—	Pounds	Value
Scotland	10,205	$2,179
Canada	2,450	1,432
Calendar year, 1919	12,655	$3,611
Calendar year, 1918	126,731	29,015
Fiscal year, 1917-18	202,646	47,211
Fiscal year, 1916-17	763	558
Fiscal year, 1915-16	60,023	11,446
Fiscal year, 1914-15	9,457	4,603
Fiscal year, 1913-14	14,649	5,255
Fiscal year, 1912-13	22,352	2,665
Fiscal year, 1911-12	1,011	945
Fiscal year, 1910-11	62,391	19,235
Fiscal year, 1909-10	74,137	13,886
Fiscal year, 1908-09	9,370	3,730
Fiscal year, 1907-08	....	....
Fiscal year, 1906-07	5,000	700

GUAYULE

IMPORTS OF GUAYULE BY COUNTRIES (FREE)

From—	Pounds	Value
North America— Mexico	3,204,224	$760,690
Calendar year, 1919	3,204,224	$760,690
Calendar year, 1918	1,376,085	413,484
Fiscal year, 1917-18	4,307,539	1,341,095
Fiscal year, 1916-17	2,854,372	764,484
Fiscal year, 1915-16	2,816,068	880,813
Fiscal year, 1914-15	5,111,849	1,441,367
Fiscal year, 1913-14	1,475,804	607,076
Fiscal year, 1912-13	10,218,191	4,345,088
Fiscal year, 1911-12	14,238,625	6,463,787
Fiscal year, 1910-11	19,749,522	10,443,157

IMPORTS OF GUAYULE BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
New York	140,043	$22,233
San Antonio	3,064,181	738,457
Calendar year, 1919	3,204,224	$760,690

REEXPORTS OF GUAYULE

To—	Pounds	Value
United Kingdom— England	2,206	$620
Canada	4	1
Calendar year, 1919	2,210	$621
Calendar year, 1918	9,778	2,936

JELUTONG (PONTIANAK)

IMPORTS OF JELUTONG BY COUNTRIES (FREE)

From—	Pounds	Value
Europe— England	164,523	$25,399
Totals, Europe	164,523	$25,399
North America— Canada	351,791	$114,824
Totals, North America	351,791	$114,824
South America— Brazil	52,381	$5,409
Totals, South America	52,381	$5,409
Asia— East India— British— Straits Settlem'nts	13,485,039	$1,590,215
Dutch	4,568,968	474,117
Japan	40,000	4,000
Totals, Asia	18,094,007	$2,068,332
Calendar year, 1919	18,662,702	$2,213,964
Calendar year, 1918	9,932,476	683,551
Fiscal year, 1917-18	7,481,292	474,366
Fiscal year, 1916-17	....	....
Fiscal year, 1915-16	27,858,335	1,322,262
Fiscal year, 1914-15	14,851,264	731,995
Fiscal year, 1913-14	24,926,571	1,155,402
Fiscal year, 1912-13	45,345,338	2,174,441
Fiscal year, 1911-12	48,795,268	2,255,050
Fiscal year, 1910-11	51,420,872	2,872,633
Fiscal year, 1909-10	52,392,444	2,419,223
Fiscal year, 1908-09	24,826,296	852,372
Fiscal year, 1907-08	22,803,303	1,039,776
Fiscal year, 1906-07	28,437,660	1,085,098

IMPORTS OF JELUTONG BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
New York	16,516,505	$2,019,121
San Francisco	508,812	37,972
Washington	1,637,385	156,871
Calendar year, 1919	18,662,702	$2,213,964

REEXPORTS OF JELUTONG

To—	Pounds	Value
Canada	163,034	$26,873

BALATA

IMPORTS OF BALATA BY COUNTRIES (FREE)

From—	Pounds	Value
Europe— United Kingdom— England	132,565	$122,563
Totals, Europe	132,565	$122,563
North America— Canada	5,900	$3,127
Central American States— Panama	250,433	102,794
West Indies— British— Trinidad and Tobago	187	112
Haiti	24,354	22,295
Totals, North America	280,874	$128,328
South America— Brazil	2,637	$1,960
Colombia	197,113	89,425
Ecuador	11,100	4,610
Guiana— British	136,910	106,711
Dutch	224,970	187,843
Peru	1,500	446
Venezuela	360,506	227,397
Totals, South America	934,736	$618,392
Asia— East Indies— British— Straits Settlem'nts	600	$240
Other British	279,359	67,515
Totals, Asia	279,959	$67,755
Calendar year, 1919	1,628,134	$937,038
Calendar year, 1918	1,547,338	836,383
Fiscal year, 1917-18	2,449,881	1,278,610
Fiscal year, 1916-17	3,287,445	1,649,452
Fiscal year, 1915-16	2,544,405	996,102
Fiscal year, 1914-15	2,472,224	963,384
Fiscal year, 1913-14	1,533,024	793,126
Fiscal year, 1912-13	1,318,598	766,772
Fiscal year, 1911-12	1,517,066	984,012
Fiscal year, 1910-11	878,305	624,702
Fiscal year, 1909-10	399,003	196,878
Fiscal year, 1908-09	1,157,018	522,872
Fiscal year, 1907-08	584,582	276,756
Fiscal year, 1906-07	799,029	305,041
Fiscal year, 1905-06	374,220	152,689

IMPORTS OF BALATA BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
New York	1,342,275	$866,156
Buffalo	6,900	3,127
Dakota	279,359	67,515
Vermont	600	240
Calendar year, 1919	1,629,134	$937,038

REEXPORTS OF BALATA

To—	Pounds	Value
Europe— Germany	11,000	$5,200
United Kingdom— England	278,222	158,021
Totals, Europe	289,222	$163,221
North America— Canada	13,774	$8,092
Miquelon, Langley, etc.	1,530	520
Totals, North America	15,304	$8,612
South America— Uruguay	551	$549
Asia— Japan	46,400	$33,736
Calendar year, 1919	351,477	$206,118
Calendar year, 1918	706,185	436,252
Fiscal year, 1917-18	473,915	303,338
Fiscal year, 1916-17	879,765	474,538
Fiscal year, 1915-16	667,168	245,329
Fiscal year, 1914-15	1,076,619	426,735
Fiscal year, 1913-14	223,983	127,139
Fiscal year, 1912-13	118,334	77,963
Fiscal year, 1911-12	62,529	38,423
Fiscal year, 1910-11	264,589	235,575
Fiscal year, 1909-10	....	42,750
Fiscal year, 1908-09	....	223,907
Fiscal year, 1907-08	....	18,741
Fiscal year, 1906-07	....	12,659

RECLAIMED RUBBER

EXPORTS OF RECLAIMED RUBBER BY COUNTRIES

To—	Pounds	Value
Europe— Belgium	13,468	$2,400
France	180,570	26,574
Italy	11,375	1,916
Netherlands	127,915	25,900
Sweden	143,858	23,837
United Kingdom— England	321,504	53,906
Scotland	448,000	73,297
Totals, Europe	1,246,690	$207,830
North America— Canada	3,750,138	$619,524
West Indies— Cuba	30	15
Totals, North America	3,750,168	$619,539
Asia— East Indies— British— Straits Settlem'nts	20,000	$3,575
Japan	46,574	7,397
Totals, Asia	66,574	$10,972
Africa— British— South Africa	7,200	$1,597
Calendar year, 1919	5,070,632	$839,938

Calendar year, 1918...	2,904,234	$502,176
Fiscal year, 1917-18...	3,284,958	567,278
Fiscal year, 1916-17...	4,938,991	814,199
Fiscal year, 1915-16...	6,406,946	871,262
Fiscal year, 1914-15...	5,970,380	822,561
Fiscal year, 1913-14...	5,583,860	834,440
Fiscal year, 1912-13...	5,413,247	932,904
Fiscal year, 1911-12...	5,397,806	875,501
Fiscal year, 1910-11...	4,994,527	781,650
Fiscal year, 1909-10...	3,622,556	535,795
Fiscal year, 1908-09...	3,196,551	414,861
Fiscal year, 1907-08...	2,947,974	418,738
Fiscal year, 1906-07...	4,550,788	665,109
Fiscal year, 1905-06...	4,084,696	511,843
Fiscal year, 1904-05...	a	522,902

(a) Not officially reported.

EXPORTS OF RECLAIMED RUBBER BY CUSTOMS DISTRICTS

At—	Pounds	Value
Massachusetts	2,817	$563
New York	1,115,990	186,773
Philadelphia	201,657	33,063
New Orleans	30	15
Buffalo	2,115,600	353,976
Michigan	352,259	57,963
St. Lawrence	395,041	65,876
Vermont	887,238	141,709
Calendar year, 1919...	5,070,632	$839,938

SUBSTITUTES, ELASTICON, ETC.

IMPORTS OF ELASTICON AND SIMILAR SUBSTITUTES FOR INDIA RUBBER BY COUNTRIES (DUTIABLE)

From—	Pounds	Value
EUROPE—		
France	110	$95
United Kingdom—		
England	166,040	12,816
Totals, Europe	166,150	$12,911
NORTH AMERICA—		
Canada	10	$39
ASIA—		
East Indies—		
British—		
Straits Settlem'nts	225,663	$34,987
Dutch	269	29
Totals, Asia	225,932	$35,016
Calendar year, 1919...	392,092	$47,966
Calendar year, 1918		383,497
Fiscal year, 1917-18		136,438
Fiscal year, 1916-17		39,815
Fiscal year, 1915-16		16,179
Fiscal year, 1914-15		30,349
Fiscal year, 1913-14		87,642
Fiscal year, 1912-13		97,452
Fiscal year, 1911-12		87,328
Fiscal year, 1910-11		115,601
Fiscal year, 1909-10		114,516
Fiscal year, 1908-09		60,625
Fiscal year, 1907-08		27,000

IMPORTS OF ELASTICON AND SIMILAR SUBSTITUTES OF INDIA RUBBER BY CUSTOMS DISTRICTS (DUTIABLE)

At—	Pounds	Value
Massachusetts	112,000	$4,015
New York	100,866	12,400
Porto Rico	16	6
San Francisco	179,200	31,506
Buffalo	10	39
Calendar year, 1919...	392,092	$47,966

REEXPORTS OF ELASTICON AND SIMILAR SUBSTITUTES OF INDIA RUBBER BY COUNTRIES

To—	Pounds	Value
Canada	70	$202
British South Africa	305	155
Calendar year, 1919...	375	$357
Calendar year, 1918...	....	65,765
Fiscal year, 1917-18...	....	11,098

SCRAP RUBBER

IMPORTS OF SCRAP RUBBER BY COUNTRIES (FREE)

From—	Pounds	Value
EUROPE—		
France	1,453,606	$134,663
Italy	366,852	102,483
United Kingdom—		
England	2,178,756	146,527
Totals, Europe	3,999,214	$383,673
NORTH AMERICA—		
British Honduras	226	$45
Canada	5,585,397	384,247
Central American States—		
Nicaragua	3,580	1,061
Panama	49,935	1,875
Mexico	6,222	341
Newfoundland and Labrador	96,350	5,918
West Indies—		
British—		
Jamaica	13,270	276
Trinidad and Tobago	3,336	48
Other British	2,270	78
Cuba	923,710	40,677
Dominican Republic	8,671	510
Totals, North America	6,692,967	$435,076
SOUTH AMERICA—		
Guiana—		
British	60	$3
Venezuela	16,163	840
Totals, South America	16,223	843
ASIA—		
Other British East Indies	2,921	$1,168
OCEANIA—		
New Zealand	65,766	$4,849
Philippine Islands	134	10
Totals, Oceania	65,900	$4,859
Calendar year, 1919...	10,777,225	$825,619
Calendar year, 1918...	8,526,420	645,581
Fiscal year, 1917-18...	13,980,303	1,019,222
Fiscal year, 1916-17...	20,517,328	1,569,448
Fiscal year, 1915-16...	16,371,573	1,271,903
Fiscal year, 1914-15...	11,006,928	726,914
Fiscal year, 1913-14...	25,958,261	2,063,198
Fiscal year, 1912-13...	43,385,456	3,709,238
Fiscal year, 1911-12...	26,293,192	2,095,605
Fiscal year, 1910-11...	26,948,000	2,334,870
Fiscal year, 1909-10...	37,364,671	2,998,697
Fiscal year, 1908-09...	20,497,695	1,543,267
Fiscal year, 1907-08...	16,331,035	1,496,822
Fiscal year, 1906-07...	29,335,193	2,607,987

IMPORTS OF SCRAP RUBBER BY CUSTOMS DISTRICTS (FREE)

At—	Pounds	Value
Maine and New Hampshire	1,011,246	$74,740
Massachusetts	62,303	3,174
New York	4,957,746	426,986
Philadelphia	78,681	6,130
Florida	59,190	2,293
San Antonio	400	40
San Francisco	68,166	4,929
Washington	96,919	4,029
Buffalo	2,208,652	156,406
Chicago	107,672	6,545
Dakota	41,845	3,101
Duluth and Superior	54,200	556
Michigan	593,134	26,268
Ohio	134	10
St. Lawrence	1,057,268	80,787
Vermont	379,669	29,625
Calendar year, 1919...	10,777,225	$825,619

EXPORTS OF SCRAP RUBBER BY COUNTRIES

To—	Pounds	Value
EUROPE—		
Belgium	88,580	$13,130
Denmark	129,600	22,090
France	603,099	$100,015
Germany	201,000	29,204
Italy	22,400	3,136
Netherlands	1,283,640	127,062
Norway	40,000	2,500
Spain	27,202	3,220
Sweden	188,640	31,150
United Kingdom—		
England	1,488,874	189,422
Scotland	447,981	42,988
Totals, Europe	4,521,016	$563,917
NORTH AMERICA—		
Canada	2,316,488	$178,578
Central American States—		
Panama	321	71
Mexico	500	35
West Indies—		
Cuba	105	10
Virgin Islands of United States	112	12
Totals, North America.	2,317,526	$178,706
ASIA—		
China	49	$14
Japan	1,453,462	66,356
Totals, Asia	1,453,511	$66,370
Calendar year, 1919...	8,292,053	$808,993
Calendar year, 1918...	2,931,929	287,883
Fiscal year, 1917-18...	2,117,257	235,811
Fiscal year, 1916-17...	3,696,661	415,526
Fiscal year, 1915-16...	3,904,715	400,148
Fiscal year, 1914-15...	2,422,091	291,421
Fiscal year, 1913-14...	6,207,672	598,287
Fiscal year, 1912-13...	7,269,465	880,442
Fiscal year, 1911-12...	7,336,984	780,188
Fiscal year, 1910-11...	7,049,729	723,664
Fiscal year, 1909-10...	6,143,610	578,944
Fiscal year, 1908-09...	4,071,795	402,897
Fiscal year, 1907-08...	4,255,789	449,727
Fiscal year, 1906-07...	4,756,621	548,695

EXPORTS OF SCRAP RUBBER BY CUSTOMS DISTRICTS

At—	Pounds	Value
Georgia	147	$42
Maine and New Hampshire	15,037	549
Massachusetts	331,565	33,741
New York	3,968,535	508,363
Philadelphia	255,311	23,716
New Orleans	321	71
Hawaii	155,143	4,277
San Francisco	359,087	15,815
Washington	1,005,918	46,093
Buffalo	737,430	72,036
Dakota	70	15
Michigan	492,950	31,812
Montana and Idaho	2,790	3,018
St. Lawrence	556,219	34,337
Vermont	411,530	35,108
Calendar year, 1919...	8,292,053	$808,993

REEXPORTS OF SCRAP RUBBER

To—	Pounds	Value
Germany	900	$180
Canada	970	26
Calendar year, 1919...	1,870	206
Calendar year, 1918...	58,574	16,032
Fiscal year, 1917-18...	74,497	16,965
Fiscal year, 1916-17...	1,626	215
Fiscal year, 1915-16...	9,204	734
Fiscal year, 1914-15...	3,483	373
Fiscal year, 1913-14...	24,295	2,450
Fiscal year, 1912-13...	87,930	10,723
Fiscal year, 1911-12...	302,105	28,196
Fiscal year, 1910-11...	401,231	43,338
Fiscal year, 1909-10...	61,395	5,373
Fiscal year, 1908-09...	38,506	2,093
Fiscal year, 1907-08...	21,713	2,943
Fiscal year, 1906-07...	105,463	9,444

Note.—Details of exports of domestic merchandise by countries for the calendar year 1918, were given on pages 736, 737 of THE INDIA RUBBER WORLD, September 1, 1920.

EXPORTS OF UNITED STATES RUBBER GOODS, CALENDAR YEAR, 1919 (BY CUSTOMS DISTRICTS*)

	Belting, Hose, and Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Druggists' Rubber Sundries Value	Tires Automobile Value	Tires All Other Value	All Other Manufactures of Rubber Value	TOTALS VALUE
FROM—										
Georgia	$3,524	7	$28	....	....	....	$14,847	....	$2,779	$21,178
Maine and New Hampshire	28,817	27,128	82,374	8,426	$10,631	$10,593	109,541	$46,047	19,723	307,726
Maryland	128,766	....	....	....	....	....	92,260	7,333	4,279	232,638
Massachusetts	56,992	84,458	218,143	1,021,310	677,138	33,746	125,380	82	541,398	1,652,879
New York	3,963,008	91,298	230,126	4,200,476	3,324,573	813,376	22,056,081	1,249,204	5,326,516	36,962,884
Philadelphia	221,477	12	31	35,913	30,494	5,197	394,737	7	46,128	701,071
Porto Rico	3,424	12	30	114	142	98	22,299	1,845	4,737	32,575
Virginia	75	....	....	....	....	....	392	....	....	467
Rhode Island	....	36	150	....	....	....	....	....	14,976	15,126
Florida	14,919	11	47	409	401	322	858,596	28,997	43,133	946,415
Galveston	4,723	....	....	....	....	....	1,004	....	2,936	8,663
Mobile	2,455	....	....	21,131	19,469	41	8,431	666	1,409	32,471
New Orleans	52,428	557	1,674	72,414	67,655	9,602	92,715	8,115	21,118	253,307
Sabine	18,284	110	442	....	....	1,277	31,281	816	1,327	53,427
Arizona	101,065	116	544	3,564	3,927	3,556	98,564	3,770	14,873	226,299
El Paso	55,457	5	40	16,628	13,849	7,969	28,566	1,191	9,795	116,867
San Antonio	188,530	20	113	4,821	4,075	12,965	411,227	22,590	80,080	719,580
Alaska	1,125	420	2,317	560	1,890	15	687	....	364	6,398
Hawaii	....	....	....	....	....	14	840	....	1,800	2,654
Oregon	404	....	....	....	....	788	4,820	....	54	6,066
San Francisco	750,917	8,951	26,604	164,796	142,469	61,130	2,757,810	88,911	640,194	4,468,035
Southern California	5,353	52	291	1,435	1,336	4,992	26,479	5,075	11,174	54,700
Washington	75,328	12,757	42,917	51,365	58,117	15,766	463,173	22,105	85,662	763,068
Buffalo	133,128	1,650	4,808	19,218	19,153	61,814	328,627	20,718	865,828	1,434,076
Dakota	74,201	2,515	11,360	45,474	38,485	41,706	437,601	35,739	230,022	869,114
Duluth and Superior	25,004	82	233	1,405	3,493	3,961	4,133	384	8,875	46,083
Michigan	55,662	23,516	68,153	671	528	25,102	256,502	4,778	127,512	538,237
Montana and Idaho	1,202	174	234	1	4	194	14,326	234	4,117	20,311
Ohio	1,095	....	....	....	....	....	170	....	....	1,265
St. Lawrence	80,477	595	1,927	1,474	2,587	33,613	224,600	6,520	265,543	615,267
Vermont	49,620	6,628	22,127	122,883	130,970	122,669	58,970	2,100	721,421	1,107,877
Calendar year, 1919	$6,100,460	261,110	$714,713	5,794,488	$4,551,386	$1,270,506	$28,924,659	$1,557,227	$9,097,773	$52,216,724
‖Calendar year, 1918	4,525,243	772,586	2,799,116	1,285,110	1,584,747	772,539	14,511,621	755,888	5,762,079	30,711,233
Fiscal year, 1917-18	4,578,396	1,559,598	4,861,213	1,244,170	913,128	884,245§	13,977,671	1,130,623	6,194,816	32,540,092
Fiscal year, 1916-17	3,532,383	600,455	1,483,379	3,356,484	1,716,225	....	12,330,201	2,547,652	8,265,509	29,875,349
Fiscal year, 1915-16	2,986,953	720,130	1,619,260	1,976,896	1,046,102	....	17,936,227	3,003,077	7,290,345	33,881,964
Fiscal year, 1914-15	1,807,848	318,727	726,765	2,219,900	2,053,560	....	4,963,270	576,602	3,525,486	13,653,531
Fiscal year, 1913-14	2,372,887	101,361	279,206	1,634,258	834,289	....	3,505,267	563,372	3,453,472	11,008,493
Fiscal year, 1912-13	2,605,551	109,528	274,330	2,231,467	1,163,953	....	3,943,220	611,458	3,913,036	12,511,548

	Belting, Hose, and Packing Value		Boots and Shoes† Pairs	Boots and Shoes† Value		Druggists' Rubber Sundries Value	Tires Automobile Value	Tires All Other Value	All Other Manufactures of Rubber Value	TOTALS VALUE
Fiscal year, 1911-12	$2,315,484	....	2,545,076	$1,502,890	....	....	$2,657,809	$546,833	$4,144,273	$11,167,289
Fiscal year, 1910-11	2,163,416	....	3,984,332	2,219,430	....	....	2,085,107‡	592,470	3,886,825	10,947,248
Fiscal year, 1909-10	1,960,825	....	3,791,084	1,984,739	....	....	....	....	5,115,331	9,060,895
Fiscal year, 1908-09	1,498,445	....	2,396,435	1,292,673	....	....	....	....	3,823,956	6,615,074
Fiscal year, 1907-08	1,347,775	....	3,080,253	1,614,290	....	....	....	....	3,743,040	6,705,105
Fiscal year, 1906-07	1,253,369	....	2,310,420	1,231,898	....	....	....	....	3,729,643	6,211,910
Fiscal year, 1905-06	1,221,159	....	2,693,690	1,505,082	....	....	....	....	2,966,144	5,692,385
Fiscal year, 1904-05	994,100	....	2,390,539	1,214,342	....	....	....	....	2,572,375	4,780,817
Fiscal year, 1903-04	880,010	....	2,310,420	1,231,898	....	....	....	....	3,729,643	6,214,910
Fiscal year, 1902-03	819,985	....	2,307,401	1,056,491	....	....	....	....	2,299,875	4,176,351
Fiscal year, 1901-02	634,146	....	2,594,708	1,046,315	....	....	....	....	1,781,941	3,462,402
Fiscal year, 1900-01	565,726	....	1,459,100	724,015	....	....	....	....	1,727,527	3,017,268

*Exports of United States rubber goods, calendar year 1919, by countries, were published in THE INDIA RUBBER WORLD, September 1, 1920, page 737.

†States separately after 1912. ‡Tires were not specifically reported before 1910-11. §Druggists' rubber sundries were not specifically reported before 1917-18. ‖These figures are given for the calendar year ended December 31, 1918.

RUBBER STATISTICS FOR THE DOMINION OF CANADA

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	June 1919 Pounds	June 1919 Value	June 1920 Pounds	June 1920 Value
Rubber, gutta percha, etc.:				
UNMANUFACTURED—*free:*				
From United Kingdom	140,165	$62,953	1,654,854	$960,073
United States	442,023	195,618	687,148	271,475
Belgian Congo	....	....	30,421	35,228
Brazil	....	....	156,863	75,258
British East Indies:				
Ceylon	45,472	42,630	112,000	64,819
Straits Settlements	398,561	188,034	1,398,718	735,409
Other countries	....	....	5,462	2,185
Totals	1,026,221	$489,235	4,045,466	$2,144,447
Rubber, recovered	211,019	$38,417	435,890	$80,950
Rubber, powdered, and rubber or gutta percha scrap	124,287	18,963	261,628	26,295
Rubber substitutes	100,228	6,984	76,243	9,181
Totals unmanufactured	1,461,755	$553,599	4,819,027	$2,260,873
PARTLY MANUFACTURED—				
Hard rubber sheets and rods	35,695	$6,674	8,134	$6,490
Hard rubber tubes	....	1,437	....	5,063
Rubber thread, not covered	1,001	1,474	5,321	7,485
Totals, partly manufactured	36,696	$9,585	13,455	$19,038
MANUFACTURED—				
Belting	....	$5,659	....	$21,978
Hose	....	8,584	....	11,281
Packing	....	9,211	....	14,225
Boots and shoes	....	16,770	....	19,376
Clothing, including waterproofed	....	20,624	....	22,993
Gloves	....	989	....	1,295
Hot water bottles	....	1,308	....	4,402
Tires, solid	....	23,392	....	17,694
Tires, pneumatic	....	106,938	....	116,913
Tires, inner tubes	....	10,076	....	12,863
Other manufactures	....	174,237	....	390,917
Totals, manufactured	....	$377,788	....	$633,937
Totals, rubber imports	....	$876,608	....	$2,797,422
Insulated wire and cables:				
Wire and cables covered with cotton, linen, silk, rubber, etc.	....	$22,810	....	$21,402
Copper wire and cables, covered as above	....	6,704	....	23,825
Chicle	183,032	137,202	23,645	14,470

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS

	June 1919 Produce of Canada Value	June 1919 Reexports of Foreign Goods Value	June 1920 Produce of Canada Value	June 1920 Reexports of Foreign Goods Value
UNMANUFACTURED—				
Crude and Waste rubber	$27,908	$6,835	$12,110	......
MANUFACTURED—				
Belting	$997	......	$9,738	......
Hose	1,695	......	13 674	......
Boots and shoes	45.846	$839	91,772	$906
Clothing, including waterproofed	10.570	......	7.315	......
Tires, pneumatic	365.876	......	850.820	......
Tires, other kinds	30,707	5,731	5.493	18,544
Other manufactures	15.720	2,657	73 552	1,900
Totals, manufactured	$471,411	$9,227	$1,052,364	$21,350
Totals, rubber exports	$499,319	$16,062	$1,064.474	$21,350
Chicle	$73,737	......	......	......

RUBBER STATISTICS FOR ITALY

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	Two Months Ended February			
	1919		1920	
Unmanufactured—	Quintals[1]	Lire[2]	Quintals	Lire
Crude rubber and gutta percha—raw and reclaimed:				
From Great Britain	......		28	
French Colonies in Asia	97		898	
British India and Ceylon	5,143		674	
Straits Settlements	6,455		923	
French African Colonies	754	18,096,750	381	4,308,150
Belgian Congo	......		142	
Brazil	4,786		942	
Other countries	......		115	
Totals	17,235	18,096,750	4,103	4,308,150
Rubber scrap	......	......	11	1,980
Totals, unmanufactured	17,235	18,096,750	4,114	4,310,130
Manufactured				
India rubber and gutta percha—				
Threads	80	208,000	17	44,200
Sheets, including hard rubber	75	120,000	10	15,100
Tubes	17	20,400	8	10,400
Belting	61	85,400	177	247,800
Rubber coated fabrics in pieces	51	81,500	49	76,900
Boots and shoes ... *pairs*	6,473	97,095	19,730	295,950
Elastic webbing	43	120,400	12	33,600
Clothing and articles for travel	......	......	25	80,000
Tires and tubes				
From France	969		50	
Great Britain	......	2,328,000	633	2,474,400
Other countries	1		348	
Other manufactures	4,100	6,253,600	1,179	1,842,400
Totals, manufactured	......	9,314,395	......	5,120,750
Total imports	......	27,411,145	......	9,430,880

EXPORTS OF CRUDE AND MANUFACTURED RUBBER

	1919 Quintals	1919 Lire	1920 Quintals	1920 Lire
Unmanufactured—				
India rubber and gutta percha—raw and reclaimed:				
To Austria	......		300	
Spain	1,632	652,800	......	316,000
United States	......		490	
Totals	1,632	652,800	790	316,000
Waste	......	......	655	78,600
Totals, unmanufactured	1,632	652,800	1,445	394,600
Manufactured—				
India rubber and gutta percha—				
Threads	50	135,000	76	205,200
Sheets, including hard rubber	21	47,400	59	78,900
Tubes	138	161,800	166	193,100
Belting	76	121,600	......	......
Rubber coated fabrics in pieces	1	1,200	27	32,400
Boots and shoes ... *pairs*	......	......	446	10,175
Elastic webbing	165	495,000	180	540,000
Clothing and articles for travel	......	......	63	302,400
Tires and tubes:				
To Austria	......		108	
Belgium	462		110	
Czecho-Slovakia	......		278	
France	63		157	
Great Britain	121		1,616	
Spain	1		76	
Switzerland	1		116	
British India and Ceylon	......	2,888,000	689	10,697,000
Dutch East Indies	......		447	
Straits Settlements	......		192	
Australia	241		170	
Argentina	274		428	
Brazil	286		445	
Other countries	71		798	
Totals, tires exported	1,520	2,888,000	5,630	10,697,000
Other rubber goods	217	308,000	1,529	2,202,600
Totals, manufactured	......	4,158,000	......	14,261,775
Total exports	......	4,810,800	......	14,656,375

[1] One quintal equals 220.46 pounds.
[2] One lira equals $0.193 (normal).

THE MARKET FOR RUBBER SCRAP

NEW YORK

Practically no business is being done in rubber scrap of any kind, due to general shutting down of reclaiming for lack of a market for their products. The abnormally low level for crude rubber is apparently not the primary factor producing this condition, if it is even a contributing one, since the demand for scrap and reclaims is absent in the principal lines where the latter does not replace crude.

Rubber scrap prices are nominal. Reclaimers regard boots and shoes that are held around 5 to 5½ cents with No. 1 auto peelings around 4 cents unwarrantably high.

QUOTATIONS FOR CARLOAD LOTS DELIVERED

Prices subject to change without notice

October 26, 1920

BOOTS AND SHOES:			
Arctic tops	*lb.*	*$0.075 @	
Boots and shoes	*lb.*	*.05½ @	.05¾
Trimmed arctics	*lb.*	*.05¼ @	.05¾
Untrimmed arctics	*lb.*	*.04¼ @	.04¾
HARD RUBBER:			
Battery jars, black compound	*lb.*	*.01 @	.01¼
No. 1, bright fracture	*lb.*	*.23 @	.24
INNER TUBES:			
No. 1	*lb.*	*.11½ @	.12
Compounded	*lb.*	*.06 @	.07
Red	*lb.*	*.05½ @	.06
MECHANICALS:			
Black scrap, mixed, No. 1	*lb.*	*.03½ @	.04
No. 2	*lb.*	*.02½ @	.02¾
Car springs	*lb.*	*.03½ @	.04
Heels	*lb.*	*.03 @	.03½
Horse-shoe pads	*lb.*	*.03 @	.03½
Hose, air brake	*lb.*	*.03½ @	.03¾
fire, cotton lined	*lb.*	*.01½ @	.01¾
garden	*lb.*	*.01½ @	.01¾
Insulated wire stripping, free from fiber	*lb.*	*.03½ @	.04
Matting	*lb.*	*.01¼ @	.01½
Red packing	*lb.*	*.05½ @	.06
Red scrap, No. 1	*lb.*	*.09 @	.10
No. 2	*lb.*	*.06¾ @	.07¼
White scrap, No. 2	*lb.*	*.08 @	.09
No. 1	*lb.*	*.10 @	.11
TIRES:			
Pneumatic—			
Auto peelings	*lb.*	*.03¾ @	.04¼
Bicycle	*lb.*	*.02¼ @	.02¾
Standard white auto	*lb.*	*.03 @	.03½
Mixed auto	*lb.*	*.01¾ @	.02¼
Stripped, unguaranteed	*lb.*	*.01 @	.02½
White, G. & G., M. & W., and U. S.	*lb.*	*.03½ @	.04
Solid—			
Carriage	*lb.*	*.03 @	.03¼
Irony	*lb.*	@	
Truck	*lb.*	*.02½ @	.02¾

*Nominal.

THE MARKET FOR COTTON AND OTHER FABRICS

NEW YORK

American Cotton has declined steadily during the past month due to lack of buying interest. On October 1, spot middling uplands was 25 cents compared with 31.2 cents last year. In the absence of mill buying the market continued weak throughout the month and on October 25 spot middling uplands was quoted 22.5 cents compared with 37.4 a year ago.

Cotton planters are refusing to sell at the present market and thousands of bales are going into storage until 30 cents will be realized.

Arizona Cotton is being offered at approximately 60 cents for the good grades. The staple this season is somewhat shorter than last, which should please the spinners who have been unable to take the very long cotton which was grown during the last two seasons.

Egyptian Cotton. The market during the past two or three days has reacted somewhat sharply and medium grade Sakel, which recently could have been bought for around 50 cents, is now 6 to 8 cents higher. Medium grade uppers were offered about

the middle of the month at 34 cents and this same cotton is now worth 40 cents. Crop reports are not so encouraging and in place of the early estimates of seven and a half million cantars we are today advised that the crop will probably not exceed six and a quarter million. High grades are exceedingly scarce and it now looks like a medium grade crop.

There is but little interest in Sea Islands; the average extra choice is quoted 70 to 75 cents. The supply will be exceedingly small.

Ducks, Drills and Osnaburgs. The demand has been limited and in consequence of the weakness in raw cotton prices have declined.

Raincoat Fabrics. Business in fabrics for the raincoat and proofing trades has felt the depression ruling in all cotton goods lines. Very little business is being booked and manufacturers are buying from hand to mouth. Through lack of supporting demand and a declining cotton market, prices have fallen.

Sheetings. There is little going on in this market. Mills that have not shut down are looking for business. There is quite a lot of goods being offered by second hands. The market is weak and prices lower.

Tire Fabrics. There is nothing being offered in tire fabrics other than surplus stocks in the hands of tire manufacturers. Practically all fabric mills have ceased manufacturing for the tire trade in order to avoid overloading the market. Mill quotations are unobtainable.

NEW YORK QUOTATIONS

October 26, 1920

Prices subject to change without notice

ASBESTOS CLOTH:				
Brake lining, 2½ lbs. sq. yd., brass or copper insertion	*lb.*		@	
2¼ lbs. sq. yd., brass or copper insertion	*lb.*		@	
BURLAPS:				
32—7-ounce	100 *yards*	*$7.25	@	
32—8-ounce			@	
40—7½-ounce		*8.25	@	
40—8-ounce		*7.00	@	
40—10-ounce		*10.50	@	
40—10½-ounce		*9.25	@	
45—7½-ounce		*10.00	@	
45—8-ounce		*10.25	@	
48—10-ounce		*15.00	@	
DRILLS:				
38-inch 2.00-yard	*yard*	*.26	@	
40-inch 2.47-yard		*.22⅜	@	
52-inch 1.90-yard		*.34¼	@	
52-inch 1.95-yard		*.33⅜	@	
60-inch 1.52-yard		*.39½	@	
DUCK:				
CARRIAGE CLOTH:				
38-inch 2.00 yard enameling duck	*yard*	*.29	@	
48-inch 1.74-yard		*.34	@	
72-inch 16.66-ounce		*.72¾	@	
72-inch 17.21-ounce		*.75¼	@	
MECHANICAL:				
Hose	*pound*	*.55	@	
Belting		*.55	@	
HOLLANDS, 40-INCH:				
Acme	*yard*	*.27¾	@	
Endurance		*.26¼	@	
Penn		*.26⅞	@	
OSNABURGS:				
40-inch 2.35-yard	*yard*		@	
40-inch 2.48-yard			@	
37½-inch 2.42-yard			@	
RAINCOAT FABRICS:				
COTTON:				
Bombazine 64 x 60	*yard*	.20	@	
60 x 48		.18	@	
Cashmeres, cotton and wool, 36-inch, tan		.90	@	
Twills 64 x 72		.35	@	
64 x 102		.43	@	
Twill, mercerized, 36-inch, blue and black		.37½	@	
tan and olive		.35	@	
Tweed		$0.60	@	$1.00
printed		.22½	@	
Plaids 60 x 48		.19	@	
56 x 44		.18	@	
Repp		.30	@	.35
Prints 60 x 48		.20	@	
64 x 60		.22	@	
IMPORTED WOOLEN FABRICS SPECIALLY PREPARED FOR RUBBERIZING—PLAIN AND FANCIES:				
63-inch, 3¼ to 7½ ounces	*yard*	.90	@	2.25
36-inch, 2¾ to 5 ounces		.70	@	1.84
IMPORTED PLAID LINING (UNION AND COTTON):				
63-inch, 2 to 4 ounces	*yard*	.78	@	1.64
36-inch, 2 to 4 ounces		.49	@	.94
DOMESTIC WORSTED FABRICS:				
36-inch, 4½ to 8 ounces	*yard*	.70	@	1.54
DOMESTIC WOVEN AND PLAID LININGS (COTTON):				
36-inch, 3¾ to 5 ounces		.22	@	.28
SHEETINGS, 40-INCH:				
48 x 48, 2.35-yard	*yard*	.19½	@	
48 x 48, 2.50-yard		.18½	@	
48 x 48, 2.85-yard		.15	@	
64 x 68, 3.15-yard		.18¼	@	
56 x 60, 3.60-yard		.14¼	@	
48 x 44, 3.75-yard		.14	@	
SILKS:				
Canton, 38-inch	*yard*	.45	@	
Schappe, 36-inch		.65	@	
STOCKINETTES:				
SINGLE THREAD:				
3½ Peeler, carded	*pound*		@	
4½ Peeler, carded			@	
6½ Peeler, combed			@	

DOUBLE THREAD:		
Zero Peeler, carded	pound	@
3½ Peeler, carded		@
6½ Peeler, combed		@
TIRE FABRICS:		
BUILDING:		
17¼-ounce Sakellarides, combed	pound	@
17¼-ounce Egyptian, combed		@
17¼-ounce Egyptian, carded		@
17¼-ounce Peelers, combed		@
17¼-ounce Peelers, carded		@
CORD:		
15-ounce Egyptian	pound	@
BICYCLE:		
8-ounce American	pound	@
10-ounce American		@
CHAFER:		
9¼-ounces Sea Island	pound	@
9¼-ounce Egyptian, carded		@
9¼-ounce Peeler, carded		@

*Nominal.

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS

NEW YORK

Owing to the closing down of tire manufacturing companies to a fractional part of their capacity the demand for such compounding ingredients as zinc oxide, carbon black and lithopone has had a marked effect on the market for these items.

In the case of zinc oxide trade conditions have led to the severest reduction in output of zinc spelter in the history of the American industry. Over 90 per cent of the operators, 72 in number, have shut down for a period of two weeks. This will afford opportunity for the working up of 40,000 tons of purchased ore in the bins at the mines.

ALUMINUM HYDRATE. The demand has continued steady during the month at 25 cents per pound for the light grade.

ANILINE OIL. This material has moved very slowly, the demand not being equal to the supply. Spot stocks are quoted at 27 cents.

BARYTES. There is a scarcity of supply of spot goods. Prices rose early in the month and were nominal at the close with some export demand. The shortage of cars at the mines has lessened somewhat.

BLANC FIXE. The restricted supplies of crude barytes limit the output of blanc fixe badly. The market is bare of stock at the present time.

BENZOL. There has been a good export demand and firm domestic demand. Early in the month spot stocks of the 90 per cent grade were bringing 35 cents a gallon.

BLACKS. The demand by tire manufacturers continues light although fair in other lines. This has led producers to seek for new outlets for their surplus product.

CHINA CLAY. The market has been steady and the supply rather short.

CARBON BISULPHIDE. There has been fair demand for the rather limited supply.

CARBON TETRACHLORIDE. This material has remained firm at 13½ cents a pound.

DRY COLORS. There have been price reductions in some colors and a not particularly active demand.

LITHARGE. The supply has been equal to the continued active demand from trades other than rubber manufacturers.

LITHOPONE. The general demand has been very steady and prices have held from 8½ to 8¾ the entire month.

SUBLIMED LEAD. Prices and demand have each held steady.

SULPHUR. The market has continued quiet.

SOLVENT NAPHTHA. Routine demand with no marked changes in price.

WHITING. While there have been some importations of chalk, good demand continues to absorb it, leaving small stocks of spot whiting.

ZINC OXIDE. The demand is reported fair, prices firm, and stocks not excessive. These conditions are liable to change shortly due to the reduced production previously noted.

NEW YORK QUOTATIONS

OCTOBER 26, 1920

Prices subject to change without notice

ACCELERATORS, ORGANIC				
Accelerene (New York)	lb.	$4.75	@	
Accelemal	lb.	.60	@	.65
Aldehyde ammonia crystals	lb.	2.00	@	2.25
Aniline oil	lb.	.27½	@	
Excellerex	lb.	.65	@	.75
Hexamethylene tetramine (powdered)	lb.	2.00	@	2.25
•N. C. C.	lb.	.50	@	
No. 999	lb.	.18	@	
Paraphenylenediamine	lb.	2.60	@	2.70
Thiocarbanilide	lb.	.60	@	.65
Velosan	lb.	3.70	@	
Vul-Ko-Cene	lb.	.35	@	
Virol	lb.	.80	@	
ACCELERATORS, INORGANIC				
Lead, dry red (bbls.)	lb.	.12¼	@	
sublimed blue (bbls.)	lb.	.10	@	
sublimed white (bbls.)	lb.	.10	@	
white, basic carbonate (bbls.)	lb.	.10½	@	
Lime, flour	lb.	.02½	@	.03
Litharge, domestic	lb.	.11¾	@	
imported	lb.	.17	@	
sublimed	lb.	.12	@	
Magnesium, carbonate, light	lb.	.10½	@	.15
calcined extra light	lb.	.60	@	
calcined light	lb.	.35	@	
calcined medium light	lb.	.30	@	
calcined heavy	lb.	.07	@	.07½
calcined commercial (magnesite)	lb.	.04	@	
oxide, extra light	lb.	.60	@	
light technical	lb.	.35	@	
light, imported	lb.	.55	@	
imported	lb.	.55	@	
ACIDS				
Acetic, 28 per cent	lb.	.10½	@	
glacial, 99 per cent	lb.	.22¾	@	
Aqua fortis	cwt.	7.40	@	
Cresylic (97% straw color) (bbl.)	gal.	1.20	@	1.30
(95% dark) (bbl.)	gal.	1.10	@	1.20
Muriatic, 20 degrees	lb.	.06	@	
Nitric, 36 degrees	cwt.	7.28	@	
Sulphuric, 66 degrees	lb.	.03½	@	
ALKALIES				
Caustic soda, 76 per cent (bbls.)	lb.	.04½	@	.05½
Soda ash (bbls.)	lb.	.05	@	
COLORS				
Black:				
Bone, powdered	lb.	.06	@	
granulated	lb.	.11	@	.15
Carbon black (sacks, factory)	lb.	.12	@	.20
pressed	lb.	.16	@	.20
Dipped goods	lb.	1.00	@	
Drop	lb.	.07½	@	.15
Ivory black	lb.	.18	@	.30
Lampblack	lb.	.18	@	.45
Rubber black	lb.	.08½	@	
Rubber makers' black	lb.	.15	@	.35
Blue:				
Cobalt	lb.	.3[illegible]	@	.40
Dipped goods	lb.	1.50	@	
Prussian	lb.	.90	@	1.[illegible]0
Ultramarine	lb.	.18	@	.50
Rubber makers' blue	lb.	3.50	@	
Brown:				
Iron oxide	lb.	.04¼	@	.06¾
Sienna, Italian, raw and burnt	lb.	.07	@	.15
Umber, Turkey, raw and burnt	lb.	.05½	@	.09
Vandyke	lb.	.08	@	.10
Maroon oxide	lb.	.14	@	.15
Green:				
Chrome, light	lb.	.60	@	
medium	lb.	.60	@	
dark	lb.	.60	@	
commercial	lb.	.22	@	
tile	lb.	.20	@	
Dipped goods	lb.	1.50	@	
Oxide I. R.	lb.	.85	@	1.05
Oxide of chromium (casks)	lb.	1.25	@	
Rubber makers' green	lb.	3.50	@	
Red:				
Antimony, crimson, sulphuret of (casks)	lb.	.40	@	
crimson, "Mephisto" (casks)	lb.	.60	@	
crimson, "R. M. P."	lb.	.58	@	
Antimony, golden sulphuret of (casks)	lb.	.30	@	
golden, "Mephisto" (casks)	lb.	.33	@	
golden, "R. M. P."	lb.	.30	@	
vermilion sulphuret	lb.	.55	@	
Arsenic, red sulphide	lb.	.16½	@	

Dipped goods, red	lb.	$1.75	@	
purple	lb	1.75	@	
Indian	lb.	.14	@	
Para toner	lb.	2.25	@	
Red excelsior	lb.	.19	@	.22
Toluidine toner	lb.	4.25	@	
Iron oxide, reduced grades	lb.	.12	@	.14
pure bright	lb.	.16	@	.17
Spanish neutral	lb.	.05¾	@	
Venetian	lb.	.03	@	.08
Oximony	lb.	.18	@	
Vermilion, American	lb.	.25	@	.30
permanent	lb.	.37	@	
English quicksilver	lb.	1.70	@	1.75
Rubber makers' red	lb.	3.50	@	4.00
purple	lb.	3.50	@	
White:				
Albalith	lb.	.07¾	@	.08¼
Aluminum bronze, extra brilliant	lb.	.65	@	
extra fine	lb.	.75	@	
Lithopone, Beckton white	lb.	.08½	@	.08¾
Lithopone	lb.	.08	@	.08¼
Ponolith (carloads, factory)	lb.		@	
Rubber-makers' white	lb.		@	
Zinc oxide. American (factory):		C. L.		L. C. L.
Special	lb.	.10¾	@	.11
XX red	lb.	.10¼	@	.10½
French process (factory):				
White seal	lb.	.13½	@	.13¾
Green seal	lb.	.12½	@	.12¾
Red seal	lb.	.11½	@	.11¾
Azo factory:				
ZZZ (lead free)	lb.		@	
ZZ (under 5% leaded)	lb.		@	
Z (8-10% leaded)	lb.		@	
Yellow:				
Cadmium, sulphide, yellow, light, orange	lb.	2.10	@	
red	lb.	2.10	@	
Chrome, light and medium	lb.	.35	@	.38
Dipped goods	lb.	1.75	@	
Ochre, domestic	lb.	.02½	@	.05½
imported	lb.	.04¾	@	.08
Rubber makers' yellow	lb.	2.50	@	
Zinc chromate	lb.	.50	@	

COMPOUNDING INGREDIENTS

Aluminum flake (carload)	ton	33.00	@	
hydrate	lb.	.25	@	
silicate	ton	30.00	@	40.00
Ammonium carbonate (powdered)	lb.	.17¾	@	
Asbestine (carloads)	ton	35.00	@	40.00
Barium, carbonate, precipitated	ton	100.00	@	110.0
dust	ton	130.00	@	
Barytes, pure white (f. o. b. works)	ton	28.00	@	
off color	ton	20.00	@	
uniform floated	ton	28.00	@	
Basofor	lb.	.06½	@	
Blanc fixe (dry, bbls.)	lb.	.06½	@	
Bone ash	lb.	.12	@	
Carrara filler	lb.	.02	@	
Chalk, precipitated, extra light	lb.	.05	@	.05½
heavy	lb.	.04	@	.04½
China clay, Dixie	ton	22.00	@	
Blue Ridge	ton	22.00	@	
domestic	ton	10.00	@	20.00
imported	ton	19.00	@	25.00
Cotton linters, clean mill run, f. o. b. factory	lb.	.02½	@	.03½
Fossil flour (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Diatomite	lb.	.03	@	.04
Glue, high grade	lb.	.35	@	.45
medium	lb.	.30	@	.35
low grade	lb.	.20	@	.25
Graphite, flake (400-pound bbl.)	lb.	.10	@	.25
amorphous	lb.	.04	@	.08
Ground glass FF. (bbls.)	lb.	.05	@	
Infusorial earth (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Liquid rubber	lb.	.18	@	
Mica, powdered	lb.	.15	@	
Pumice stone, powdered (bbl.)	lb.	.05	@	
Rotten stone, powdered	lb.	.02½	@	.04½
Rubber paste	lb.	.19	@	.22
Silica, gold bond	ton	40.00	@	
silver bond	ton	28.00	@	
Soapstone, powdered gray (carload)	ton	12.00	@	
Starch, powdered corn	cwt.	3.48	@	4.06
Talc, powdered soapstone	ton	18.00	@	20.00
Terra blanche	ton	22.00	@	32.00
Tripoli earth, air-floated, cream or rose (factory)	ton	50.00	@	
white (factory)	ton	52.50	@	
Tyre-lith	ton	110.00	@	
Whiting, Alba (carloads)	cwt.	.80	@	.90
Columbia	cwt.	.95	@	
commercial	cwt.	1.40	@	
Danish	ton	24.00	@	
English cliffstone	cwt.	2.00	@	
gilders	cwt.	1.60	@	
Paris, white, American	cwt.	1.75	@	
Quaker	ton	16.00	@	
Super	ton	30.00	@	32.50
Wood pulp, imported	lb.	.03¾	@	
XXX	ton	75.00	@	
X	ton	60.00	@	
Wood flour, American	ton	50.00	@	

MINERAL RUBBER

Elateron (c. l. factory)	ton	60.00	@	
(l. c. l. factory)	ton	63.00	@	
Gilsonite	ton	75.00	@	
Genasco (c. l. factory)	ton	69.00	@	
(l. c. l. factory)	ton	71.00	@	
Hard hydrocarbon	ton	42.00	@	
Soft hydrocarbon	ton	$40.00	@	
K-X	ton		@	
K. M. R.	ton		@	
M. R. X.	ton		@	
Pioneer (c. l. factory)	ton	60.00	@	
(l. c. l. factory)	ton	65.00	@	
Raven M. R.	ton	60.00	@	65.00
Refined Elaterite	ton		@	
Richmond	ton		@	
No. 64	ton		@	
318/320 M. P. hydrocarbon (c. l. factory)	ton	60.00	@	
(l. c. l. factory)	ton	62.50	@	
300/310 M. P. hydrocarbon (c. l. factory)	ton	45.00	@	
(l. c. l. factory)	ton	47.50	@	
Robertson, M. R. pulverized (c. l. factory)	ton	95.00	@	
M. R. pulverized (l. c. l. factory)	ton	97.50	@	
M. R. (c. l. factory)	ton	72.50	@	
M. R. (l. c. l. factory)	ton	75.00	@	
Rubrax (factory)	ton	50.00	@	
Synpro, granulated	ton	97.50	@	
Walpole rubber flux (factory)	lb.		@	

OILS

Avoilas compound	lb.	.17	@	.19
Castor, No. 1, U. S. P.	lb.	.18	@	
No. 3, U. S. P.	lb.	.17	@	
Corn	lb.	.16	@	
Corn, refined Argo	cwt.	*17.25	@	
Cotton	lb.	.15	@	
Glycerine (98 per cent)	lb.	.31	@	
Linseed, raw (carloads)	gal.	1.02	@	1.04
Linseed compound	gal.		@	
Palmoline	lb.	.15	@	.17
Palm niger	lb.	.09	@	
Palm "Lagos"	lb.	.09½	@	
Palm special	lb.	.16½	@	
Peanut	lb.	.16	@	
Petrolatum	lb.	.08	@	.11
Petrolatum, sticky	lb.	.10	@	.14
Petroleum grease	lb.	.07½	@	.09
Pine, steam distilled	gal.	1.65	@	2.00
Rapeseed, refined	lb.	1.30	@	
blown	lb.	1.45	@	
Rosin	gal.	.60	@	.95
Synpro	gal.	.70	@	1.00
Soya bean	lb.	.14	@	
Tar	gal.	.36	@	.41

RESINS AND PITCHES

Balsam, fir	gal.	2.00	@	
Cantella gum	lb.	.50	@	
Cumar resin, hard	lb.	.12	@	.16
soft	lb.	.09	@	.13
Tar, retort	bbl.	16.00	@	16.75
kiln	bbl.	15.00	@	15.75
Pitch, Burgundy	lb.	.08	@	
coal tar	lb.	.01½	@	
pine tar	lb.	.04	@	
ponto	lb.	.14	@	
Rosin, K	bbl.	14.00	@	
strained	bbl.	12.90	@	
Shellac, fine orange	lb.	1.50	@	

SOLVENTS

Acetone (98.99 per cent drums)	lb.	.25	@	
methyl (drums)	gal.	1.50	@	
Benzol (water white, 90%)	gal.	.33	@	.47
Beta-naphthol	lb.	.52	@	
Carbon bisulphide (drums)	lb.	.08½	@	.09
tetrachloride (drums)	lb.	.13½	@	.14
Naphtha, motor gasoline (steel bbls.)	gal.	.31	@	
73 @ 76 degrees (steel bbls.)	gal.	.41	@	
70@ 72 (steel bbls.)	gal.	.39	@	
68 @ 70 degrees (steel bbls.)	gal.	.38	@	
V. M. & P. (steel bbls.)	gal.	.30	@	
solvent	gal.	.42	@	
Toluol, pure	gal.	.35	@	.40½
Turpentine, spirits	gal.	1.28	@	
wood	gal.	1.18	@	
Osmaco reducer	gal.	.65	@	
Xylol, pure	gal.	.45	@	.50½
commercial	gal.	.30	@	.35½

SUBSTITUTES

Black	lb.	.10	@	.19
White	lb.	.11	@	.22
Brown	lb.	.15	@	.20½
Brown factice	lb.	.09	@	.17
White factice	lb.	.11	@	.19
Paragol, soft and medium (carloads)	cwt.	15.81	@	
hard	cwt.	15.81	@	

VULCANIZING INGREDIENTS

Lead, black hyposulphite (Black Hypo)	lb.		@	
Orange mineral, domestic	lb.	.15¼	@	
Sulphur chloride (jugs)	lb.	.20	@	
(drums)	lb.	.08	@	
Sulphur, flour, Brooklyn brand (carloads)	cwt.	3.40	@	
Bergenport, soft (c. l. factory)	cwt.	3.80	@	
Bergenport, soft (l. c. l. factory)	cwt.	4.15	@	
superfine (carloads, factory)	cwt.		@	

(See also Colors—Antimony.)

WAXES

Wax, beeswax, white	lb.	.67	@	
ceresin, white	lb.	.16	@	
carnauba	lb.	.35	@	
ozokerite, black	lb.	.65	@	
green	lb.	.65	@	
Montan	lb.	.20	@	
paraffine, 115° m. p.	lb.	.12½	@	
120° m. p.	lb.	.12¾	@	
125° m. p.	lb.	.13½	@	
130° m. p.	lb.	.14½	@	
Sweet wax	lb.	.15	@	

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